

modern machine shop

HOW TO HOT
FORM ON A
PRESS BRAKE

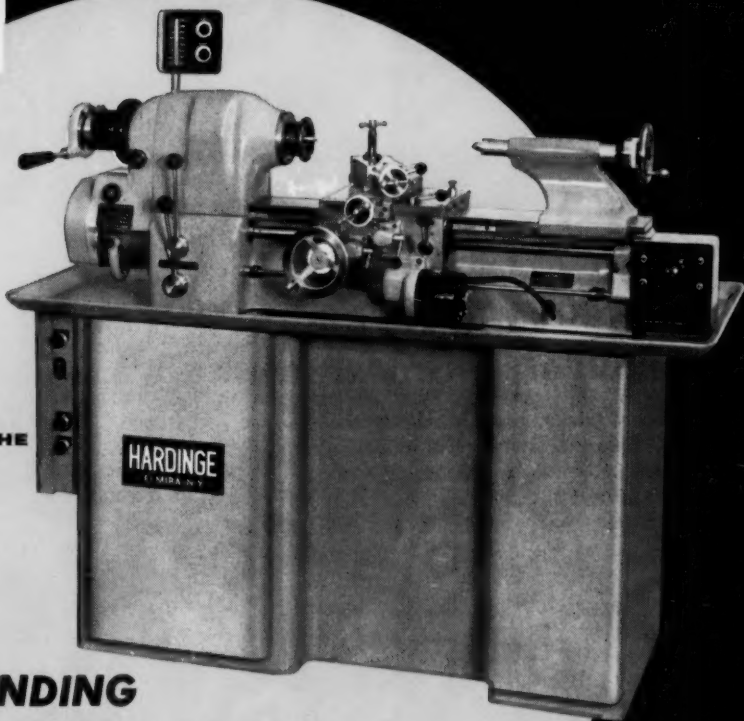
See Page 60

QUALITY CONTROL
FIGURES DON'T
LIE, BUT...

See Page 66

DECEMBER 1958

HARDINGE
ELMIRA, N.Y.



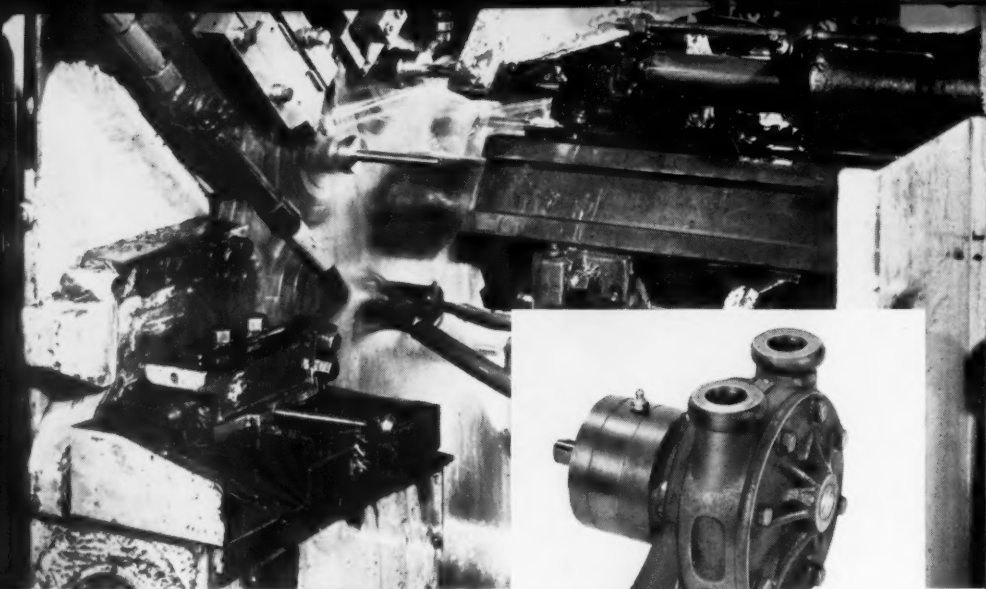
Model HLV
TOOL ROOM LATHE

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TOOL ROOM LATHE"**

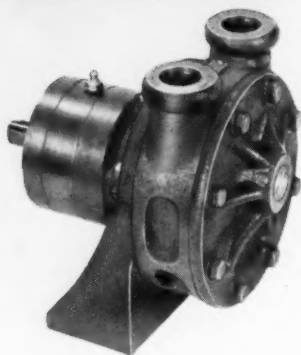
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Write for Bulletin HLV



No dilution problem with cutting oil on automatic screw machines at Tuthill Pump Co. Cleartex lubricates machine as well as cutting surface, speeds production of equipment like Tuthill Model CK pump (right).



No cutting oil dilution for 10 years in Tuthill's automatics—thanks to Cleartex

Texaco Cleartex is the dual-purpose oil that eliminates cutting oil dilution on automatic screw machines. Ever since Tuthill Pump Co., Chicago, started using Cleartex in 1948, they have been able to report complete elimination of the dilution problem, as well as increased production and longer tool life between regrinds.

Cleartex solved Tuthill's cutting oil problem by combining in one product a fine cutting oil and a premium lubricant. The combination of high stability, rust protection and relatively high extreme-pressure properties makes Cleartex a top

performer in both categories.

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Member



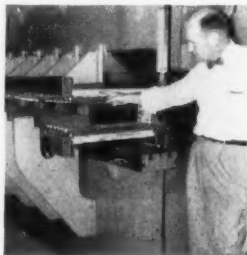
features in

Assembling & Finishing...Inspecting, Testing & Control...
Press Working...Management & Safe Practices...Materials
& Processes...Production Machining...Tooling & Design

HOT FORMING ON A PRESS BRAKE

By Donald F. Turner

Conventional 200-ton press brake is converted by Thermo-Form Company for high temperature forming of the exotic materials now commonly employed in aircraft and missile production. Converted machine is designed to brake form, contour, draw, size and stress relieve such materials as magnesium, Mag-thorium, titanium, hot work tool steels, and corrosion resistant steels at temperatures up to 1300 deg. Fahrenheit.



Page 60

FIGURES DON'T LIE, BUT . . .

By C. W. Kennedy

Two possible reasons for the quality control engineer's recently recurring difficulties in machining areas are discussed at length. Considerably inter-related, these difficulties include measurement for one and thinning tolerances for another.

Page 66

PRACTICAL POINTERS FOR PROFITABLE HEAT TREATING

By A. S. Eves

In this installment, the author continues his discussion of how to economically case harden steel, covering such subjects as selective hardening; carburizing of powdered metal parts; some unusual kinds of case hardening; tempering; how to specify treatment; and choice of steel.

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n this issue

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MODERN MACHINE SHOP ARTICLE INDEX

This index provides a convenient subject listing of articles published in *Modern Machine Shop* during the past year. It is our suggestion that the readers of this magazine save this article index for future reference purposes.

Page 78

MACHINING STAINLESS STEEL

By G. J. Stevens

In this case history, Machining Engineer Stevens explains how the tapping of Type 304 stainless steel with a 1/8-inch tapered pipe tap was improved by increasing the size of the tap shank.

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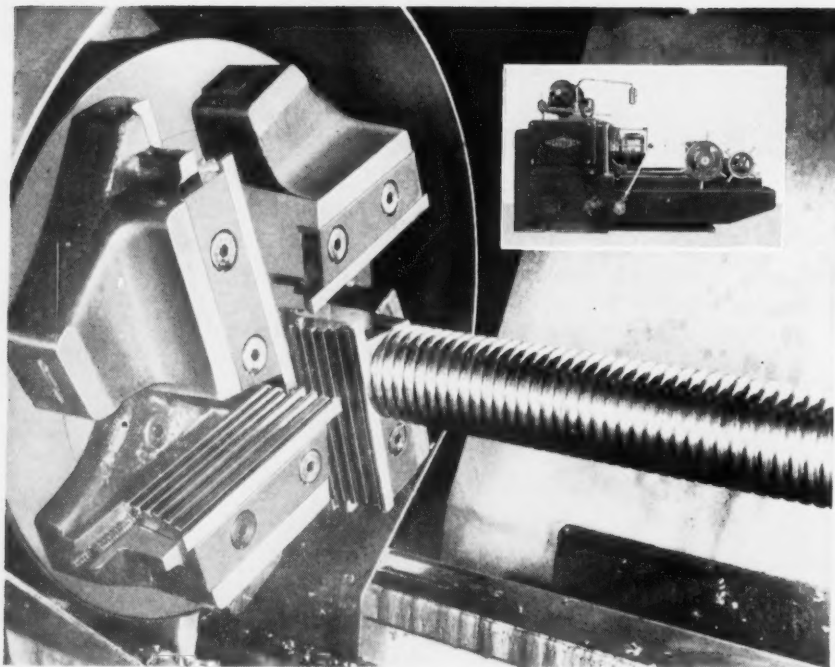
MORE PRODUCTION THROUGH MODERNIZATION

How a special tool solved a hole deburring problem at Chrysler's Lynch Road Plant is explained in one of the articles featured in this monthly department. Other articles included in this section describe how a multi-spindle driller has increased plug board plate production at the Remington Rand Division of Sperry Rand Corporation; how one machine does the work of four machines on a rocker lever boring job at the Cummins Engine Company; how at North American Aviation a particular power saw has speeded up the cutting of aircraft doublers; and how cutting fluids can improve the efficiency and economy of machine tool operations.

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modern machine shop



90% threading time saved on power screws

This large saving in the production of power screws at Rodney Hunt Machine Co. (Orange, Mass.) was made possible by the use of a LANDMACO Threading Machine.

Specifications require $2\frac{3}{4}$ " diameter— $2\frac{1}{2}$ " pitch Acme threads 56" long on cold-rolled steel. 5 hours had previously been required to complete the thread. Floor-to-floor threading time was cut to only 30 minutes after the installation of a LANDMACO 32C Single-Spindle Machine with a special 60" carriage travel.

Many features in the design of this equipment make it possible to do heavy duty threading to precision tolerances. Heavy construction and leadscrew feed assure accurate threading. Slippage of the work is prevented by an improved carriage front with 60% greater gripping power.

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Massive construction of the 4" LANCO head and chaser-holders give maximum support to the chasers for the largest or smallest diameters. The tangential design of the chasers provides lateral absorption of cutting strains and free cutting action. Their roughing-and-finishing form assures threads of excellent finish in one pass, and the centering throats eliminate the out-of-roundness common in long workpieces.

This is but one example of the production economies to be derived from using LANDIS Equipment on large diameter threading. For additional information, please send specifications and ask for Bulletin #H-45.

413

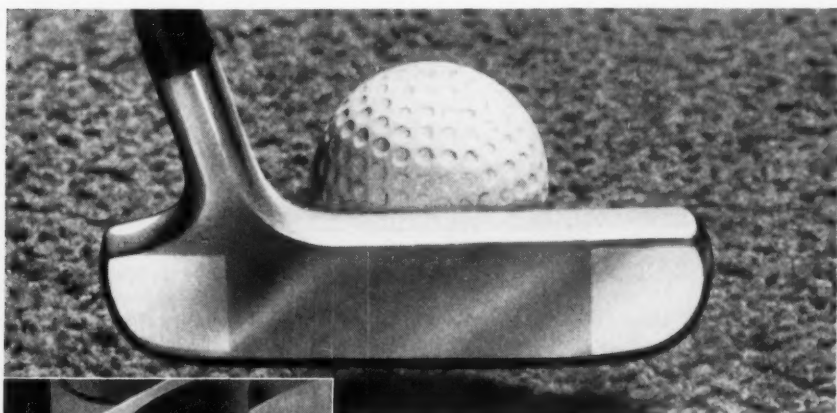
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nut running
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6 modern machine shop

December, 1958

For more data on advertisement on opposite page,
circle 308 on Postpaid Card →

it's mainly a matter of **TIMING!**

***When an old machine costs you more than it earns,
replacement pays for itself!***

There comes a time in the life of any machine, when it will no longer produce at a profit—a time beyond which its continued use represents a *financial loss* to your company. This point of obsolescence may be the result of physical aging or of technological advances. In either case, the result is the same—money wasted that could be saved by the investment in a new machine.

Determining when to replace a machine is too important for guesswork or rule-of-thumb computations. Only precise methods of comparative cost analysis will give you the right answer. Our sales engineers are well experienced in making obsolescence studies and will be glad to do the same for you. Similar studies have pointed the way to many important savings.

For Example: A manufacturer of aircraft instruments had been using a 5-year-old precision lathe to perform boring, turning and facing operations on instrument cases. But when this was replaced with a new Heald Model 0 Unit-Type Bore-Matic like that shown at the right, operating costs for the same production were immediately reduced by over 78%. In addition, the elimination of a separate burring operation and reduced assembly time made further important savings, as indicated by the cost analysis below.

	Old Machine	New Machine
Parts per hour	4.3	20
Parts per year (Req'd. Prod.)	10,000	10,000
Direct and Indirect Labor, per year	\$20,349	\$ 6,055
Scrap Losses, per year	\$ 500	\$ 300
Annual Maintenance Cost	\$ 600	\$ 300
Annual Operating Cost	\$21,449	\$ 6,655
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Additional Saving from elimination of separate operation		\$ 500
Additional Saving from reduced assembly time		\$ 1,500
Total Saving Per Year		\$16,794
Return on Investment for New Machine		84%



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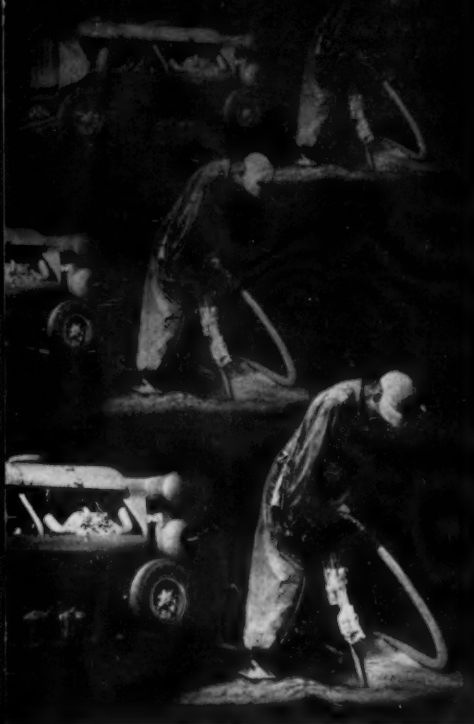
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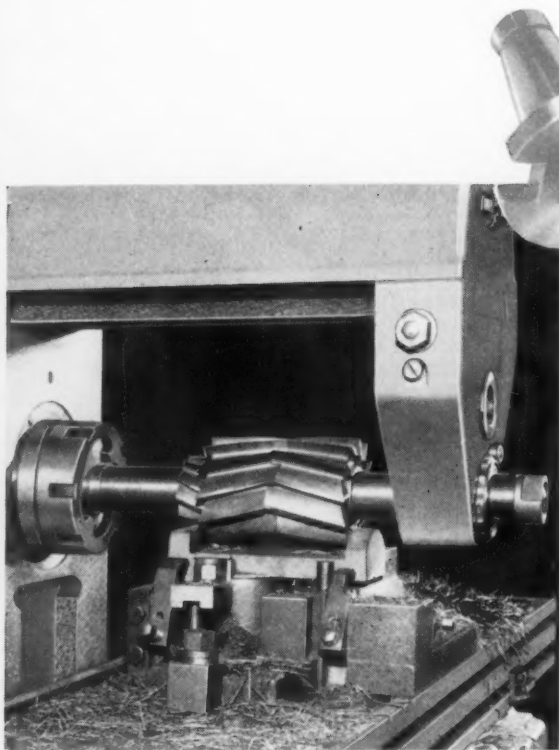
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Arbors are a critical link in milling machine setups. They influence the quality of surface finish obtainable; the selection of speeds and feeds; **and costs**. You can be sure that Cincinnati arbors and complementary accessories will be a strong link in your milling machine setups. They transmit full machine power to the cutter on dead center rotation . . . they are manufactured to the highest standards of quality. Arbor collars, for example, are hardened and ground all over, including the ends. Cincinnati arbors are available in a variety of sizes. They can be interchanged between various Cincinnati milling machines (and other makes, too) having the same standard taper hole in the spindle. Complementary equipment includes collets, collet adapters, spindle chucks, etc. All are listed in catalog No. M-1664-6. May we send a copy to you?

CINCINNATI ARBORS — 50 SERIES TAPER SHANK

Style	Diameter x length
A	$\frac{3}{8}$ x 10", 1 x 12, 15, 18"; $1\frac{1}{4}$ x 12, 15, 18"
B	1 x 18, 24"; $1\frac{1}{4}$ x 18, 24, 30"; $1\frac{1}{2}$ x 18, 24, 30, 36, 40"; 2 x 24, 30, 36, 40, 46"; $2\frac{1}{2}$ x 30, 36, 40, 46"

Style
A



Style
B



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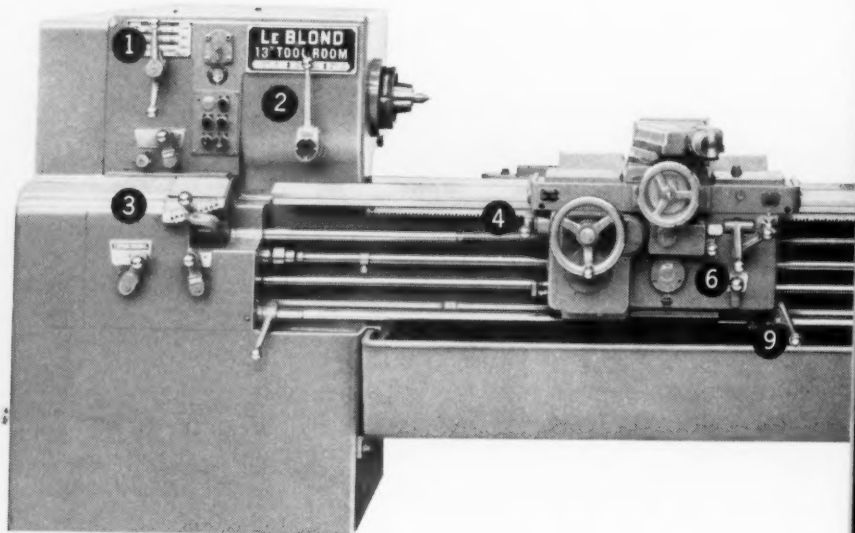
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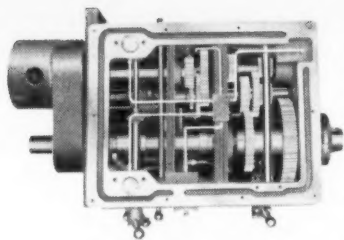
December, 1958

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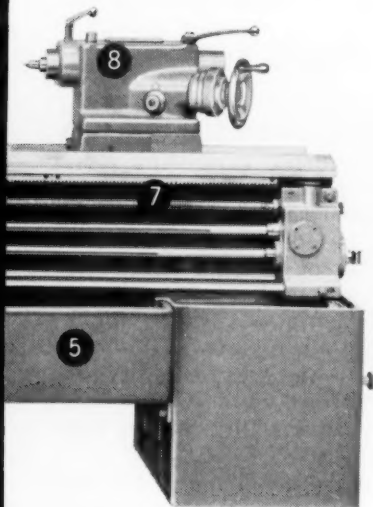
announcing . . . the 13" LeBlond precision



- ① 27 spindle speeds easily chosen by direct-reading color plate
- ② Combination gear-belt drive headstock
- ③ Totally enclosed quick change box; 60 feeds and threads
- ④ Single-lever 4-way power rapid traverse
- ⑤ Chip pan slides in grooves; easy clean out
- ⑥ One-piece totally enclosed apron; ample carriage bearing surface
- ⑦ Rigidly ribbed bed with hardened and ground steel ways
- ⑧ 2-speed thrust-lock tailstock with quick-set length dial
- ⑨ Apron controlled leadscrew reverse



new toolroom lathe



combination gear-belt headstock

The headstock of the new LeBlond 13" Precision Toolroom Lathe incorporates combination gear-belt drive, delivers 27 speeds ranging from 18 to 2250 rpm. A timing-type non-slip belt is used for the nine high speeds; lower speeds are gear-driven. A color index plate makes speed selection easy for the operator. A constant speed motor supplies up to 20 h.p. to the gear train through an electric clutch and brake (standard equipment).

adjustments for starting, stopping, jogging

Heavy work pieces are brought up to speed safely with rheostatic controls to the electric clutch and brake. Torque applied for the first six seconds is adjustable to any percentage of full torque. Similar adjustments for stopping and jogging.

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Front and center bearings are Timkens in cone-adjusted mountings. The center bearing cup is mounted in a special high speed precision adapter which relieves potential excessive preload—resulting from the inevitable heat of high-speed operation. Front and center mountings are thrust bearings. The original factory-set preload can handle both high and low speeds—no need to reset bearing adjustments in the field.

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Minimizes no-load horsepower. Only gears for a specific speed are engaged. Spur gears are fine pitched and wide to give better tooth action and great load carrying capacity. Short, heavy shafts minimize deflection, are mounted on anti-friction bearings. Spindle is completely ground, nose is hardened. Taper nose key drive is positive, simplifies set-up. Provision for multiple-start threads is made with a large easy-to-read dial at the rear of the spindle. A forced feed system lubricates every moving part in the headstock with filtered oil.

other models available

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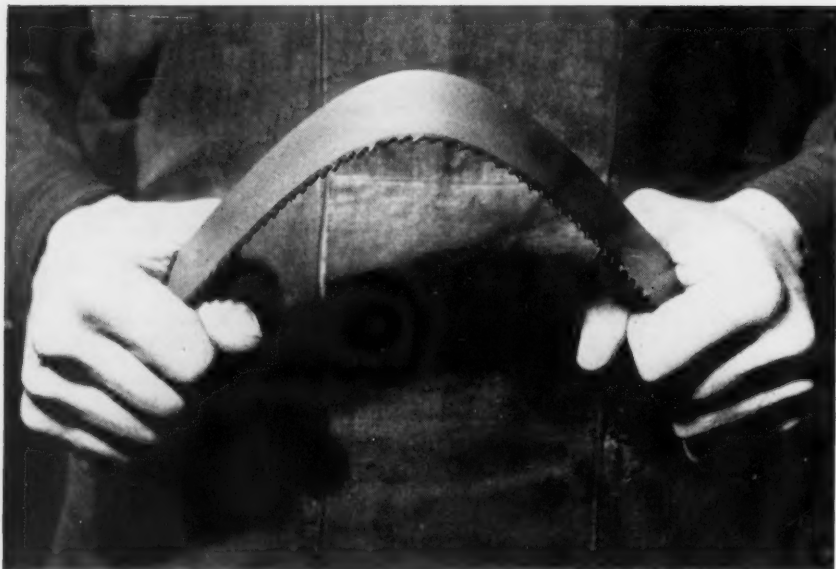


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December, 1958

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THIS is No Ordinary Power Hack Saw Blade

This is the *unbreakable* MARVEL High-Speed-Edge Hack Saw Blade—the first bi-metal blade—invented, developed and introduced by MARVEL. This blade is a combination of two materials best suited to the requirements of an efficient hack saw blade . . . a narrow high speed steel cutting edge permanently welded to a tough, non-brittle alloy steel body. Each blade is triple tempered to assure long life and maximum toughness to the cutting edge.

With a MARVEL Blade, you can cut any material—from the free machining steels to the toughest alloys . . . fast, accurately and economically.

You can tension a MARVEL Blade from 200% to 300% tauter than any ordinary blade, permitting much higher speeds and heavier feeds without deflection or breakage.

Like all good things, attempted copies of the MARVEL Blade have been numerous, but its performance has been *unequalled* by any of the imitators. Ask for MARVEL Blades by name and you can be sure you're getting the best on the market. Leading Industrial Distributors have them in stock.

Write for latest cutting tool Bulletin and the name of your nearest MARVEL Distributor.

FB-1020

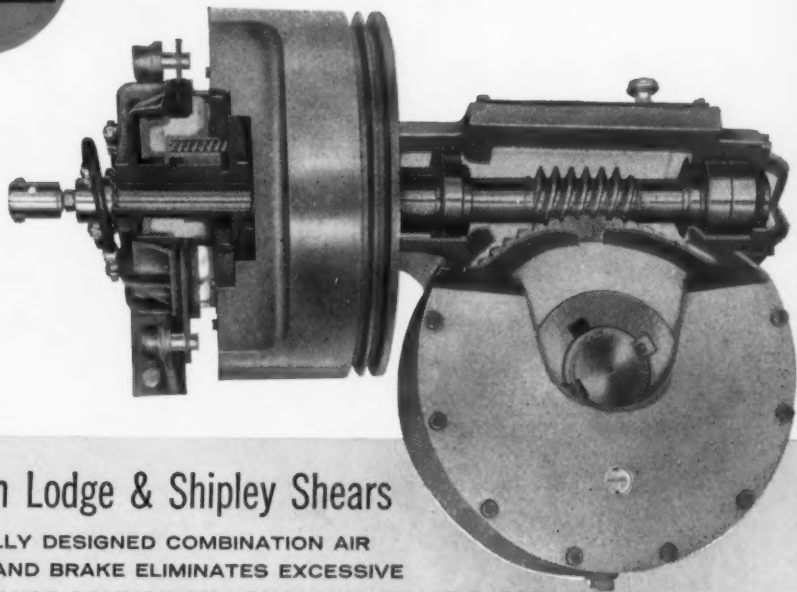


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Only on Lodge & Shipley Shears

...SPECIALLY DESIGNED COMBINATION AIR CLUTCH AND BRAKE ELIMINATES EXCESSIVE MAINTENANCE COMMON ON HEAVY DUTY PLATE SHEARS

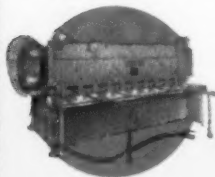
The "standard extras" you find on Lodge & Shipley Shears, although not reflected in the price, are important in time-saving, effortless operation, accuracy and low-cost service.

THE COMBINATION AIR CLUTCH AND BRAKE, for example . . . its single unit design positively eliminates overlap between clutch and brake. Disc-type construction is self-adjusting for fast, smooth starting and safe, positive stopping. The clutch provides automatic overload safety; the brake applies automatically in the event of electrical or air supply failure.

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- Blade Clearance Indicators • Air Counterbalances
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- Fast, One-man Upper Blade Adjustment
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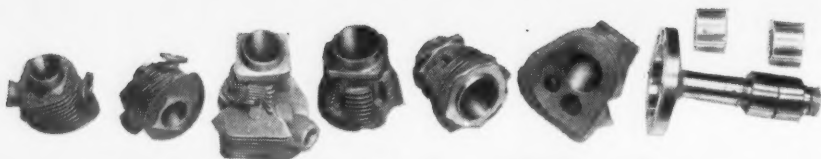
Capacities to $\frac{1}{2}$ " x 12'



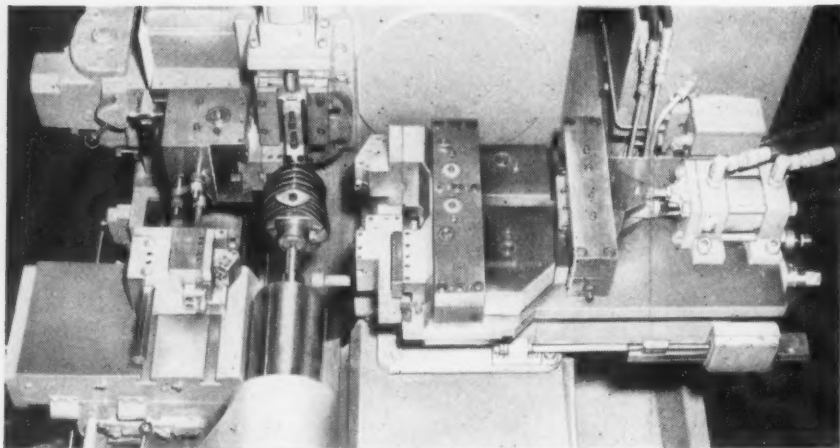
Find out how much more you get . . . **WITHOUT EXTRA COST . . .** on a Lodge & Shipley Shear. For details, see Sweet's Machine Tool File or request Bulletin No. PS-15 from: **The Lodge & Shipley Co., 3058 Colerain Ave., Cincinnati 25, Ohio.**

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Six different sizes and types of workpieces are handled easily on this job. Extra expanding mandrel and sleeves at right are for different sizes.



How Harley-Davidson speeds motorcycle part production

**Machines both ends in single chucking, using Gisholt No. 12 Automatic
to get maximum accuracy, cut production costs**

This well-planned setup reveals how Harley-Davidson Motor Co., Milwaukee, Wis., is handling cast iron front and rear cylinders.

Smart tooling on a Gisholt MASTERLINE No. 12 Automatic Production Lathe handles 6 different sizes and types of workpieces. Change-over is fast and easy. A special headstock-mounted, air-operated locating stop speeds work handling.

While tools in the front carriage turn and chamfer at one end of the piece, tools in a headstock-mounted auxiliary slide chamfer the I.D. on the other side. Simultaneously, tools on the rear slide face both ends for length. At the end of the cut, tool blocks on the rear independent slide swing open automatically to provide

tool relief before withdrawal. Floor-to-floor time on the part shown is 1.2 minutes, only 1.8 to 3.6 minutes for the other 5 workpiece types and sizes.

The new Gisholt MASTERLINE No. 12 Automatic Production Lathe is designed specifically for high production operations; yet, it is flexible enough to handle a variety of similar parts in small repeat lots. The automatic cycle frees the operator to handle other machines or do other work.

Make a note to phone your Gisholt Representative today. Ask him to come in and show you where the fast automatic cycle and flexibility of the No. 12 Automatic Production Lathe can cut your floor-to-floor time and reduce your costs.



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MACHINE COMPANY

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WRITE GISHOLT TODAY for advance data on the new Gisholt MASTERLINE No. 12 Automatic Production Lathe. Ask for Form 1178.

ASK YOUR GISHOLT REPRESENTATIVE ABOUT GISHOLT FACTORY REBUILT MACHINES WITH NEW MACHINE GUARANTEE
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John Dewhurst tells how the Moore Jig Borer pays off in production of instrument components

This is another in a series featuring the views of owners of leading tool and die companies



by **JOHN D. DEWHURST**
President
Arrow Tool Company, Inc.
Wethersfield, Conn.
Prototype and Production
of Instrument Components

"Consistent accuracy is the keystone of our ability to satisfy our customers. They demand production quantities of instrument components and assemblies varying in size, materials, and form...*finished to the same precise tolerances as their prototypes.* It's been our experience that Moore Jig Borers can be depended upon to do such jobs, and most economically, too.

"Since we need fine precision for both tooling and production, our Moore Jig Borers are invaluable. First, we use the Moore Jig Borer to hold tolerances on our tools and gages. Then, we use the same machine for a production run of 50 to 70 hours a week. Over a period of several years, our Moore Jig Borers have averaged 3100 production hours per year, holding tolerances to 'tenths,' and providing an unbeatable record of trouble-free performance."

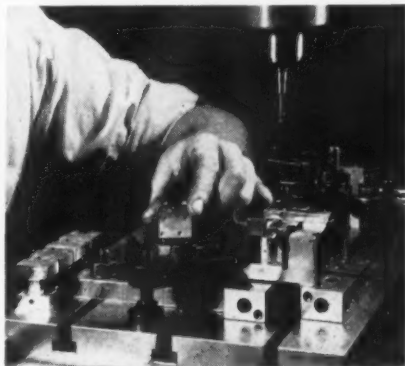
If high-precision quality production is your goal, learn how flexible Moore equipment can help you achieve it. Booklets describing the unique features of Moore Jig Borers and Jig Grinders can be obtained by writing...

MOORE SPECIAL TOOL COMPANY, INC.

730 Union Avenue, Bridgeport 7, Connecticut



HOLES, CONTOURS AND SURFACES, Moore's authoritative book, tells how to produce tools, dies and precision parts the modern way. 424 pages, 495 illustrations. \$5 in U.S.A., \$6 elsewhere.



ON SMALL COMPONENTS such as this brass block, Moore Jig Borers quickly bore close-tolerance holes. This workpiece will be part of an electronic data processing machine.



MEDIUM SIZE CASTINGS are precision-bored on this Moore Jig Borer. At Arrow Tool, Moore Jig Borers average 3100 hours per year in high-precision production operation; serve "double-duty" in holding tooling tolerances.



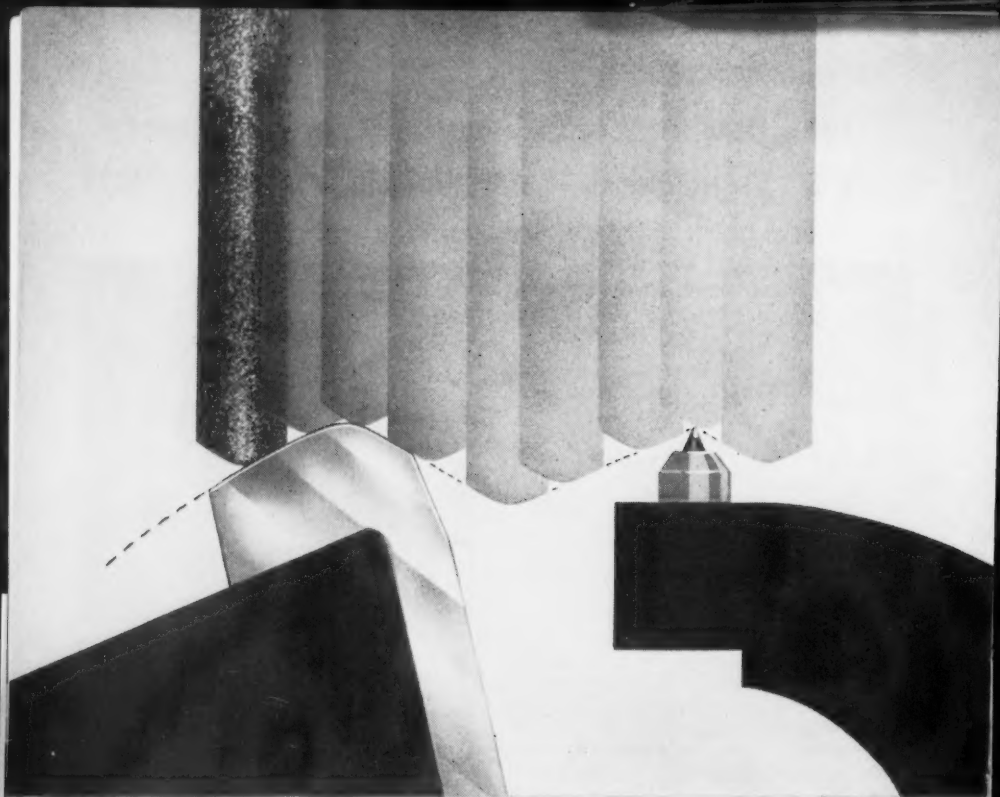
FOR TOOLING...AND PRODUCTION

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

For more data circle 318 on Postpaid Card

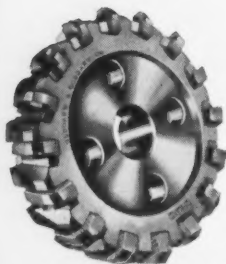
December, 1958

modern machine shop 17



Oliver AUTOMATIC Face Mill Grinder

Wheel dressed with every stroke



Oliver face mill grinders are made in four sizes to accommodate cutters from $\frac{1}{8}$ " to 21" diameter.

The drawing above shows the grinding wheel passing over a cutter tooth after being dressed and formed automatically by a fixed diamond. This happens with each stroke of the Oliver automatic face mill grinder. Thus, complete accuracy of grind is certain regardless of the number of teeth in the cutter. This exclusive Oliver of Adrian feature prevents loading of the wheel and also permits carbide grinding with a silicon carbide wheel. Automatic feed-down accurately compensates for each dressing thus providing a fixed grinding line.

The machine automatically indexes the cutter and controls the tooth shape by a simple cam arrangement so that any practical roughing or finishing form can be obtained. The machine grinds the corner angle, corner radius, face and dish all in one operation. Oliver's face mill grinder is hydraulically operated for smooth, fast (4 to 8 times faster per cutter), accurate and quiet performance.

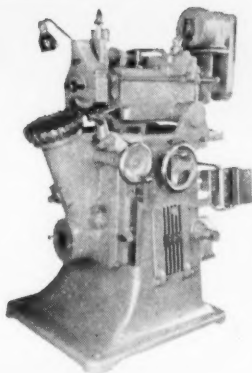
For more data circle 319 on Postpaid Card

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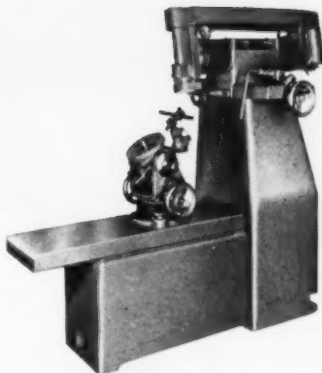
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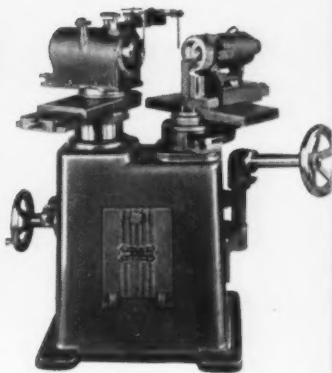
OLIVER
Automatic
FACE MILL GRINDER

... features real economy and fast, accurate grinding. One operator handles several machines. Set-up is simple. The cutter is mounted on the face plate and the automatic indexing mechanism adjusted. Required clearance is set by moving the work spindle to the desired position. All surfaces and radii are ground in one continuous operation.



OLIVER
General Purpose
FACE MILL GRINDER

... heavy duty; for all types of face mill grinding on coarse and fine pitch cutters from 4" to 24" in diameter. All angles and clearances are instantly obtained without calculation. The cutter face, periphery and corner angles may be ground without altering the lip rest setting. The machine is completely universal.



OLIVER
Arc Radius
GRINDER

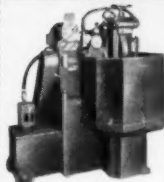
... for accurate sharpening of face mills, channel cutters, slotting cutters, etc. The face, periphery and corner radius are ground with one pass of the wheel; radius blended in perfectly. The machine will sharpen any radius up to two inches. Periphery clearance may be greater than the face. If desired, the machine will give a straight grind. High speed, diamond wheels may be used.

More **OLIVER** of **ADRIAN** Tool Grinding Equipment



ACE TOOL and
CUTTER GRINDER

Universal—grinds milling cutters, other cutting tools. Especially suited to grinding tungsten carbide.



TEMPLATE
TOOL BIT GRINDER

Controlled form grinding for high speed, stellite and tungsten carbide single point tools.



No. 510 DRILL
POINTER

Semi-automatic. For drills $\frac{1}{8}$ " to 3" in diameter. No. 21 bench models available for size $\frac{1}{8}$ " and smaller.



DRILL POINT
THINNER

For low cost reclaiming of drills. Corrects off-center and too-thick webs and end-of-index cutting edges.



DIE MAKING
MACHINE

Produces dies, gages, cams, templates, stripper plates, etc. at greatly reduced costs. 5 designs in 2 types.

Just check the coupon for literature on the **OLIVER** of **ADRIAN** machine you are interested in. Send it today to...



OLIVER of **ADRIAN**
OLIVER INSTRUMENT COMPANY

1430 E. Maumee St. • Adrian, Michigan

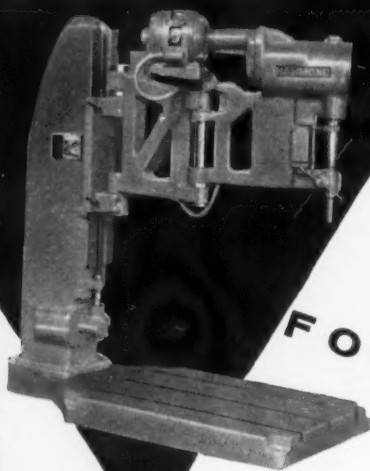
- | | |
|--|--|
| <input type="checkbox"/> Drill Pointer | <input type="checkbox"/> Die Making Machine |
| <input type="checkbox"/> Face Mill Grinder | <input type="checkbox"/> Drill Point Thinner |
| <input type="checkbox"/> "Ace" Universal Tool and Cutter Grinder | <input type="checkbox"/> Template Tool Bit Grinder |
| <input type="checkbox"/> Literature only | <input type="checkbox"/> Quotation requested |

NAME _____

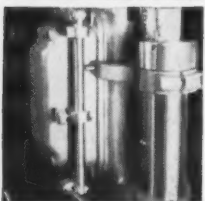
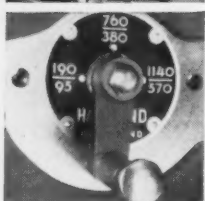
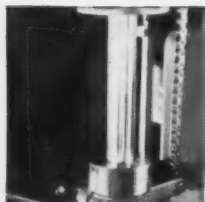
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CITY _____ ZONE _____ STATE _____



FOOTBURT



for **F**aster radial drilling and tapping

Hammond Radial Drilling and Tapping Machines may be spotted in the production line for drilling, tapping or reaming. With its unique Bracket Type construction the spindle can be swung quickly from hole to hole. Six Quick Speed Changes are instantly available and the Hammond Tapping Reverse is very fast and convenient to operate.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio
Detroit Office: 24632 Northwestern Highway, Detroit 35, Mich.

Write for Circular #7A

ENGINEERED FOR PRODUCTION

FOOTBURT

MACHINE TOOLS

For more data circle 321 on Postpaid Card



"Our new 618's", reports Bob Pringle, General Manager of Winslow Manufacturing, Cleveland, "are what we've needed to help us stay on top as the first name in precision control." With Abrasive's modern design and "operator engineered" features, the story is the same in precision shops all over the country.

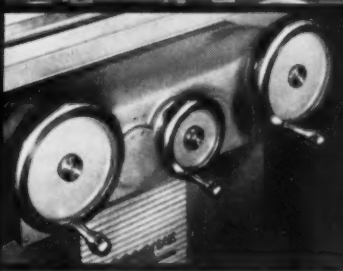
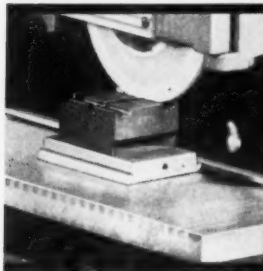
"Easy Accuracy"

**That's what one
Big Cleveland Gage Maker
says about**

**ABRASIVE
SIX EIGHTEEN**

**Hand Feed
Precision
Surface Grinders**

At Winslow, "the feature which most impressed our employees is the fast table travel. This makes it much easier to grind hardened material." And well it should! The 618 rides smoothly on precision anti-friction rollers. It is actuated by a smooth cable and drum drive. You get 6" of table movement with each turn of the 8" handwheel.



Bob Pringle goes on to report, "we have used the machine primarily for gage work and find that the finish is very good. It's excellent for side grinding, too." Heavy, rugged, deeply-ribbed construction plus the advantages in Abrasive's motorized spindle and wheel-head assembly make high finishes easy.

Precision and efficiency are vital at Winslow, and they found "the good repeatability of the 618 dial settings to be of special advantage." All operators appreciate the comfortable, balanced feel of the smooth recessed handwheels, available either right or left-handed. They like the comfort and convenience of the controls all located on the same waist-high plane.

It makes good sense for you, too, to look into the many profit-producing advantages of the new Abrasive 618's. Without obligation our colorful eight-page tell-all brochure is yours. Write for it, today!

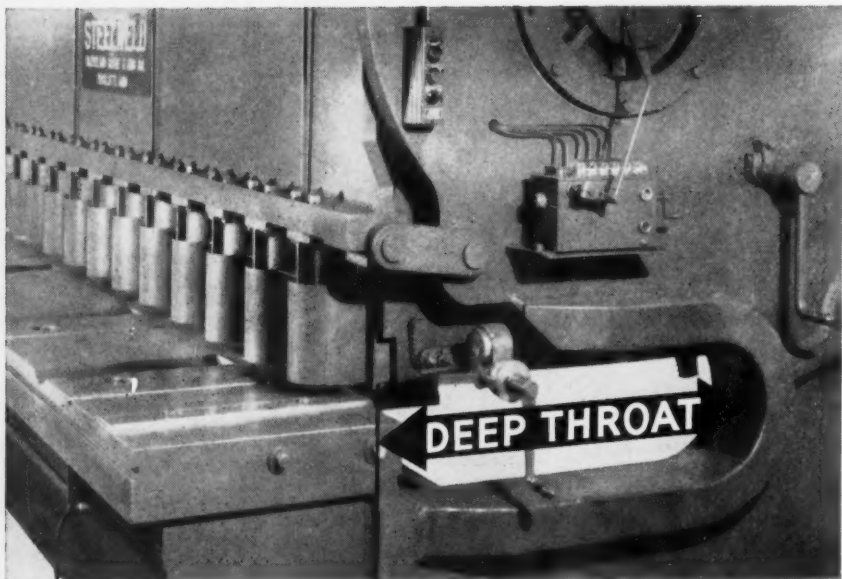
**ABRASIVE MACHINE TOOL
COMPANY**

Dexter Road
East Providence 14, Rhode Island

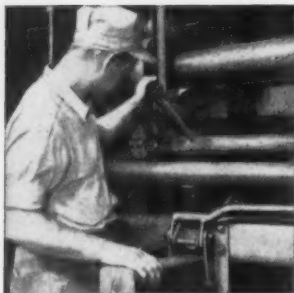
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December, 1958

modern machine shop 21



WIDE SHEETS EASILY SLIT



Steelweld Shears are built for cutting steel plate in thicknesses of $\frac{1}{4}$ to $1\frac{1}{2}$ inches and in lengths of 6 to 26 feet.

Throat depths of 24 and 36 inches make it easy to slit wide sheets on Steelweld Pivoted-Blade Shears. Twenty-four inches is the standard throat depth for all machines. Thirty-six inch throats can be provided as a special feature for many of the larger size machines.

With such deep throats it is possible to slit plates of 48" to 72" wide down the middle for any length.

It is a simple matter to adjust the blade for slitting. The easily-reached slitting adjustment shaft is turned by a spanner wrench as illustrated. When adjustment has been completed a locking device holds it securely in position.

Steelweld Shears are loaded with exclusive features that make operation easier and speed production. There are no other shears like them.



GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

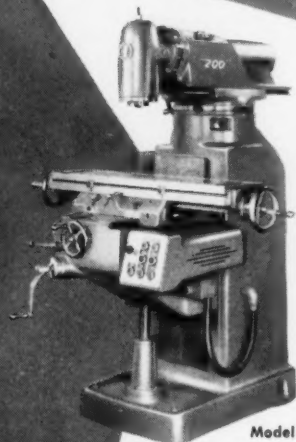
6412 East 282 Street

Wickliffe, Ohio

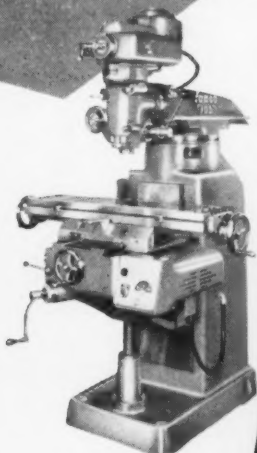
STEELWELD PIVOTED BLADE SHEARS

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modernize with Famco mills...



Model 200 (2 H.P.)



Model 100 (1 1/2 H.P.)

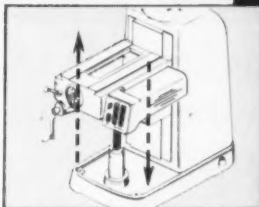
... THE MILL THAT GIVES YOU POWER FEED TO THE KNEE

The only line of milling machines in this capacity range that incorporates power feed in 3 directions—knee, table and saddle.

This Famco exclusive enables you to reduce operator fatigue and increase workmanship.

Besides, with power feed to the knee, you are assured of greater milling accuracy and versatility. This feature permits deeper more precise boring without any possibility of tool run-out.

If you want a rugged precision-built mill find out about the top quality Famco Mill line today.



Send for the Famco Milling Machine Catalog now.

famco

machine company

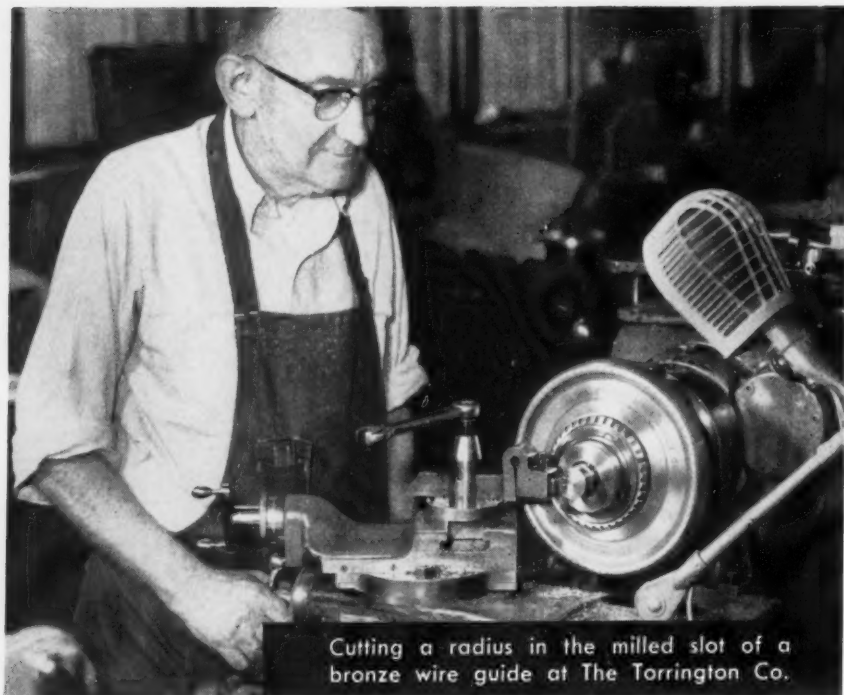
3122 Sheridan Road • Kenosha 12, Wisconsin

PRESSES...AIR, ARBOR, POWER, FOOT
SQUARING SHEARS, MILLING MACHINES, BAND SAWS

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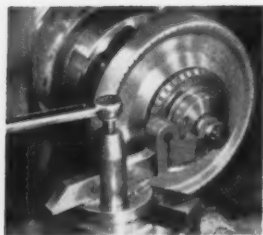
December, 1958

modern machine shop 23



Cutting a radius in the milled slot of a bronze wire guide at The Torrington Co.

"I have never used a finer chuck in more than 50 years on the job"



Turning radius in slot of bronze wire guide.

Mr. James Bagrie, holds work and tools with O.D. from $\frac{1}{16}$ " to $1\frac{1}{2}$ " in an 18 speed 12" Hendeby Lathe equipped with a Jacobs Model 91 Rubber-Flex Collet Chuck. Mr. Bagrie likes the easy-to-use versatility of the Model 91. He says:

"It's a splendid chuck in all ways. It has a good, positive grip and the hand wheel makes it a real timesaver. I've never used a finer chuck in more than 50 years on the job."

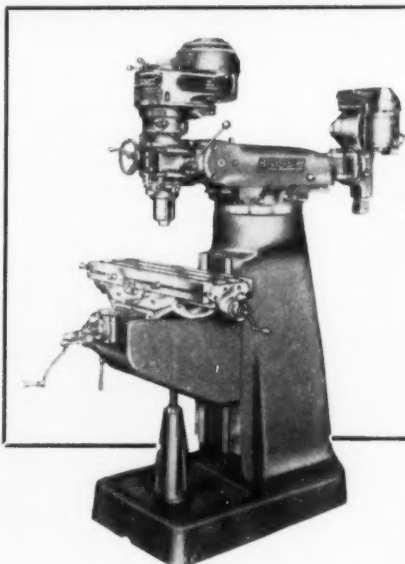
You hold your work with the tightest, most accurate grip ever devised when you hold with the Jacobs Rubber-Flex Collet. Ask your industrial supply distributor for Bulletin 57-LC on the Model 91 Hand Wheel Collet Chuck.

Jacobs and your industrial supply distributor are ready to deliver the chucks you need and the service you deserve. First in chucks . . . first in service.



The Jacobs Manufacturing Company, West Hartford, Connecticut

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Bridgeport

TURRET MILLING MACHINES

**Exclusive features and practical
attachments provide greater
versatility, accuracy and productivity**

ATTACHMENTS AND ACCESSORIES TO INCREASE VERSATILITY

Milling, Drilling and Boring Attachments. Model "J" 1 HP; Model "M" 1/2 HP; Model "R" 1/2 HP and Model "C" 1/4 HP (Rigid Spindle)

Cherrying Attachment	Right Angle Attachments
Slotting Attachment	Nos. 1, 2, 3
Power Feed	Shell Mill Holders
Measuring Attachment	Nos. 1, 2, 3
(Rods and Indicators)	Fly Cutters, FC-3, FC-4
Optical Measuring System	Threaded Arbors
(A recent addition to	End Mill Holders
the Bridgeport line)	Spindle Adapters
Hydraulic Duplicators	Vises No. 1 and 2
(Single Dimension and	(Swivel and Plain)
Three Dimension)	Profilers for Model "J"
Coolant Pump	and "M" Heads
Four-Inch Raising Block	Boring Heads Nos.
Seven-Inch Raising Block	1 and 2
Cross Travel Stops	Collets
Lights	Chucks (Jacobs and
	Albrecht)

To the many exclusive features offered in the basic "BRIDGEPORT", should be added attachments which increase versatility and all-around handling convenience.

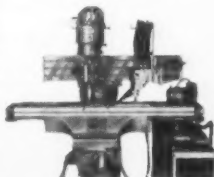
Modern design plus the finest in production equipment methods are available on a moderate investment. "BRIDGEPORTS" are THE machines for modern, accurate, milling, drilling, boring, shaping, cherrying and copying . . . for use in any shop, large or small.

Among recent developments are increased cross travel, 3-dimensional hydraulic tracing and a new optical measuring system which simplifies and improves jig boring. These features extend the utility of BRIDGEPORT TURRET MILLING MACHINES and provide greater versatility, capacity and precision.

And of equal interest to shopmen everywhere, our expanded production facilities now make it possible to ship "BRIDGEPORTS" to suit your needs. Investigate.

NEW BRIDGEPORT 3-D T-RAM HYDRAULIC TRACING MACHINE

Unexcelled for accuracy, speed and ease of performance. Equipment integral with basic machine. Designed so that 2 or 3 milling attachments can be mounted working simultaneously for multiple piece production in a single operation. T-RAM greatly increases capacity.



Ask us or your nearest dealer for more complete details.

Bridgeport

MACHINES, INC.

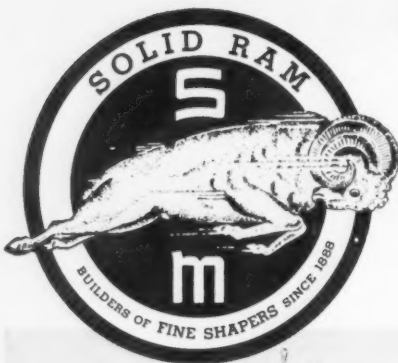
Bridgeport, Connecticut

Manufacturers of High Speed Milling Attachments and Turret Milling Machines

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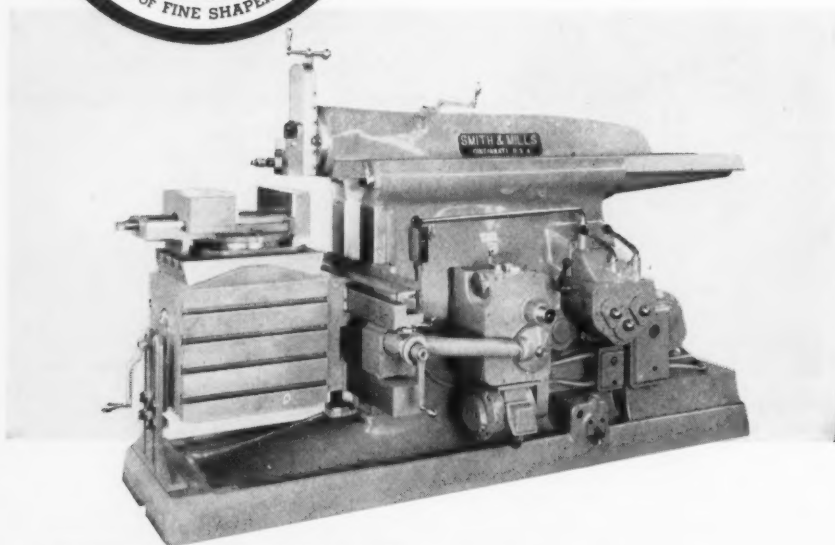
December, 1958

modern machine shop 25



EXCLUSIVE SOLID TYPE RAM

Superior strength and simplicity of adjustment through patented backlash eliminator and self-locking ram screw preventing ram from changing positions under the heaviest cut. Makes this the most outstanding shaper ram design.



SMITH & MILLS

Available with plain or universal table. Heavy duty models 16" through 36" strokes; standard duty models 20" and 24" strokes.

Shapers

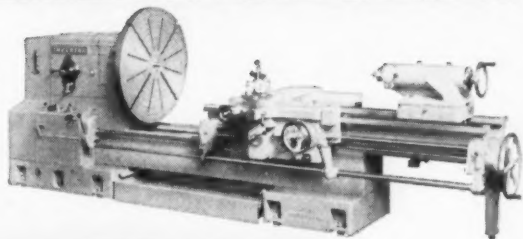
Exclusive bull gear and rocker arm design... helio-centric rotation to universal table. Write for descriptive bulletin.

Smith & Mills Shaper Division, Nebel Machine Tool Corp.
3409 CENTRAL PARKWAY, CINCINNATI 25, OHIO

For more data circle 327 on Postpaid Card

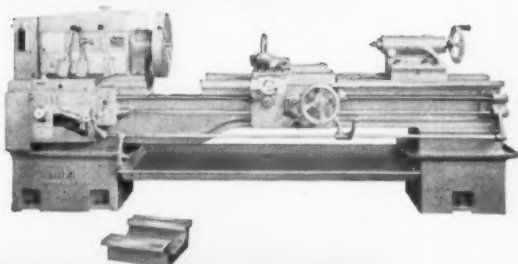
EXTENSION BED GAP LATHES

The new XB series shown here is but one of three different extension bed gap lathes in the Nebel line: XB series 26" / 45"; AG series 20" / 40"; G series 28" / 50".

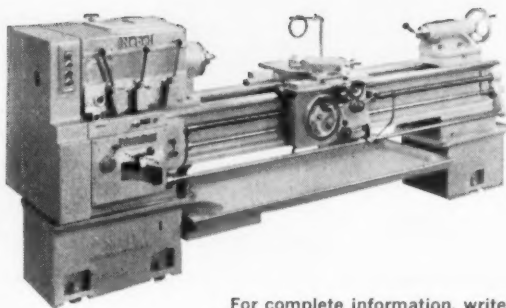


REMOVABLE BLOCK GAP LATHES

Here you have the flexible swing capacity of a gap lathe . . . plus all the advantages of a standard lathe. Made in three sizes: LA 16" / 27" and 20" / 30" at right; also D 25" / 40".



STANDARD LATHES



Now more substantial, with larger, heavier aprons, carriage and tailstocks. Made in six sizes: 16" and 20" shown at left; also 25", 27", 32" and 36". All Nebel lathes have shaved and hardened headstock gears, Timken antifriction bearings throughout.

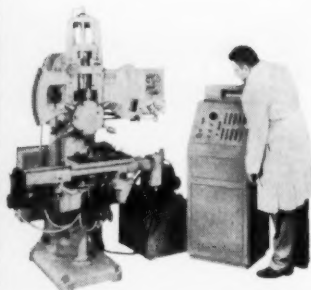
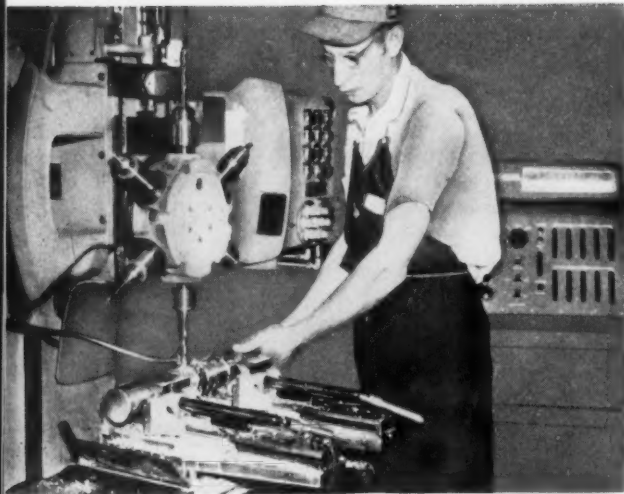
For complete information, write for descriptive bulletins, Nebel Lathe Division, Nebel Machine Tool Corp., 3409 Central Parkway, Cincinnati 25, Ohio.



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61% Average Time Savings on 5 Parts; \$

Burgmaster *tape controlled*



SIMPLIFIED TAPE PREPARATION

1. Simple hand-punched 10 1/2" wide tape. Decimal dimensions and machining sequence data is punched directly into the tape (requiring no special training, codes or computers) at an average rate of one minute per command block. Punched tapes are tooling which can be stored and re-used indefinitely.



2. Flexwriter Typewriter Punched Standard 1"-8 Hole Tape. If desired the system can be provided with standard 1"-8 hole tape control. Tapes can be quickly prepared on a Flexwriter Typewriter, by a girl typist, by typing in decimal coordinates, the spindle sequence, auxiliary functions, etc. Duplicate tapes can be automatically produced from an original punched tape.



Continuous Position Readout

The Control Display is an electric micrometer which shows, at all times, the actual position of the table to three decimal places and the number of the operation being performed in the machining sequence. The Display reads table positions to $\pm .0000''$ — $.0005''$.

4 Modes of Machine Operation

The Electropoint System provides 4 modes of operation.

1. Manual Control — for set-up, etc.
2. Semi-automatic control — for single parts, etc.
3. Complete automatic tape controlled operation.
4. Standard Burgmaster Automatic Hydraulic Control (Electropoint completely cut out by pressing a button).

Specialists in High Production Turret Drilling



1C Manual
Power Index
3/4" Capacity



2B Manual
Power Index
3/4" Capacity



2BF Flange Mounted
Power Index
3/4" Capacity



2BH Automatic
Hydraulic
3/4" Capacity



3BH Automatic
Hydraulic
1 1/4" Capacity



2BR Ram Type
Radial Drill
3/4" Capacity



2BHT — 3BHT Automatic
Tape Controlled
3/4" and 1 1/4" Capacity

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FACULTY

ts: \$35 Vise Substituted for \$400 Fixture

at Jeffrey Manufacturing Co., Columbus, Ohio

Six-Spindle Turret Drill

with Automatic Numerically Controlled Positioning Table

Eighty-one per cent average time savings on five parts ranging from 8640 steel to fiber board, using only simple holding vises instead of expensive fixtures to hold close tolerances, is easily accomplished on a Burgmaster Electropoint Six-spindle Turret Drill. The elimination of expensive fixtures greatly reduces the cost per part because many of these parts are produced on a one-time basis.

The 3" diameter 8640 steel coupling pin formerly machined in a vertical drill press in four minutes is now automatically machined in 2.6 minutes. Tolerances of $\pm .001$ " are held and the operator has time during the cycle to burr the parts in four faces on a bench drill.

And there are additional advantages:

1. The Automatic Cycle reduces fatigue—and produces consistent accuracy with no scrap loss.
2. Tools run at most efficient preselected speeds and feeds—greatly extends tool life—holds tool cost per piece to a minimum.
3. Quick set-up permits economical machining of small lots—and provides maximum flexibility and versatility.
4. Greatly reduces the number and types of machine tools required to handle a given production.
5. Shortens lead time to put new prints into production—quickly and at minimum expense.

The Burgmaster Electropoint Control System can be applied either the Model 2BHT—6 spindle or 3BHT—8 spindle Turret Drills, which are machines that are ideally suited for automatic tape control. The standard hydraulic Burgmaster controls are maintained, including pre-selective spindle speeds, infinitely variable pre-selective feeds, selective rapid approach and return, skip indexing, precision depth control, and simple manual controls for set-up. The Electropoint System automatically controls all machine functions, selects spindles in any sequence, automatically positions the table simultaneously on all axes, and clamps it in position while machining operations are being performed. All operations are carried out at their most efficient rate for high finish, precision, speed, and longest life.

Check into Burgmaster Electropoint Tape Controlled Turret Drilling, Tapping, and Boring Machines for your work. They will save you money from prototype to mass production work. There is a Burg direct representative or dealer near you. Call them—there is no obligation.

For Bulletin describing Burgmaster 6 and 8 spindle Electropoint Tape Controlled Turret Drilling, Tapping and Boring Machines, describes how to program a part, make a punched tape, and put the job on the machine for automatic production. A thirty-minute sound film showing all Burgmaster Turret Drills in operation is available from our office without charge.



JOB FACTS

PART I: Coupling Pin 3" diameter.

Material: 8640 Cold Finished.

Operations: Drill $\frac{1}{2}$ " thru, $2\frac{3}{4}$ " dia. $\frac{3}{8}$ " in from each end. Burr 4 places on bench drill during automatic drilling cycle.

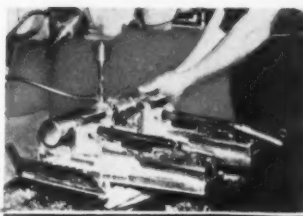
Former Method: Vertical drill press.

Former Time: 4 minutes.

Present Method: Burgmaster 2BHT Electropoint Automatic Turret Drill.

Present Time: 2.6 minutes.

Savings: 35%—\$35 clamps instead of \$400 fixture.



PART II: Arc Shield $\frac{3}{8}$ "x $2\frac{1}{2}$ "x $6\frac{1}{8}$ "

Material: Asbestos Board.

Operations: Drill 4 holes.

Former Time: 1.2 minutes on drill press.

Present Time: 23 minutes on Burgmaster 2BHT.

Savings: 97 minutes each or 809%.



PART III: Arc Shield Support

$\frac{3}{8}$ "x $1\frac{1}{8}$ "x $3\frac{1}{8}$ "

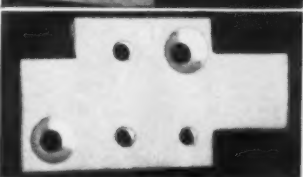
Material: Dillco Grade NC

Operations: Drill 5 holes, counterbore 2 holes, tap 3 holes.

Former Time: 4.8 minutes on drill press.

Present Time: 2.5 minutes on Burgmaster 2BHT

Savings: 2.3 minutes each or 50%.



PART IV: Panel $\frac{3}{8}$ "x $2\frac{1}{2}$ "x $4\frac{1}{8}$ "

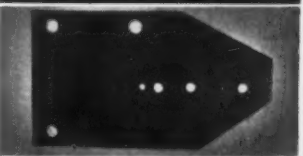
Material: Vulcoid.

Operations: Drill 7 holes, 3 different diameters.

Former Time: 5.5 minutes on drill press.

Present Time: 1.3 minutes on Burgmaster 2BHT.

Savings: 4.2 minutes each or 76%.



PART V: Base for Fuse $\frac{1}{4}$ "x $4\frac{1}{2}$ "x $7\frac{1}{2}$ "

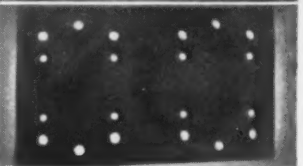
Material: Fiber Board.

Operations: Drill 20 holes, countersink 8 holes.

Former Time: 7.2 minutes on drill press.

Present Time: 2.8 minutes on Burgmaster 2BHT.

Savings: 4.4 minutes each or 64%.



BURGMASTER DIRECT SALES OFFICES:

NEW JERSEY: BURGMASTER EASTERN SALES DIV., 20 N. Maple, Ridgewood, N. J., Ph. GI 4-3002, TWX—Ridgewood, N. J. 724
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DETROIT: BURGMASTER MICHIGAN SALES DIV., 13730 W. 8 Mile Rd., Detroit 37, Mich., LI. 8-4333
SAN FRANCISCO BAY AREA: WALT COOPER, 1341 Old Country Rd., Belmont, Calif., Tel. LYWitt 1-0308
Plus dealer representatives in other industrial centers.



BURG TOOL
 MANUFACTURING COMPANY, INC.
 1001 South Figueroa Street, Gardena, California
 Faculty 1-3510, TWX—Compton, California 6011

For more data circle 330 on Postpaid Card



*A*S is our custom in the joyous holiday season we pause from concerns of business to express our grateful appreciation for the many kindnesses of our customers and friends and extend to them the old but sincere double wish—

A Merry Christmas
and Happy New Year



THE WELDON TOOL COMPANY

3000 WOODHILL ROAD • CLEVELAND 4, OHIO

For more data circle 331 on Postpaid Card

30 modern machine shop

December, 1958

HY-PRO specialists deliver savings as high as 98% with taps of special design

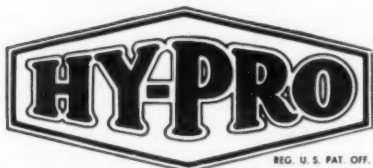
When you need special taps, you can rely on HY-PRO engineering ability and experience to deliver maximum savings . . . in tap expense, in production time.

from
300 to 18,000
holes per tap



Frangible plastic part for electronic industry. Previous tap life of 300 holes-per-tap boosted to an 18,000 rate with the use of a multi-fluted tap specially designed by HY-PRO specialists, who pioneered development of taps for plastics. Tap cost saving — 98% plus. HY-PRO pioneered development of taps for plastics and has wide experience with all types of compositions that can be applied to your advantage.

Tap Cost
SAVINGS **98%**



The Tap Engineering Specialists

NEW BEDFORD, MASS., U.S.A.

CALL YOUR LOCAL **HY-PRO DISTRIBUTOR** FOR STANDARD TAPS FROM STOCK

For more data circle 332 on Postpaid Card

December, 1958

from
100 to 800
holes per tap



Stainless steel aircraft part. HY-PRO tap of special design raised tap life from 100 holes-per-tap to 800. Threading with the original tap was rough, varying over tolerance. With the HY-PRO special, it is smooth, clean, consistently Class 3. Savings in tap cost — 88%; plus an additional big saving gained by eliminating rejects previously scrapped because of inaccurate threading.

Tap Cost
SAVINGS **88%**



Consult a HY-PRO specialist. Whether you need standard or special taps, he can show you how to get lowest tap cost per hole. Write Dept. G.

ASK FOR STOCK LIST OF SPECIAL TAPS
AVAILABLE FOR IMMEDIATE DELIVERY

HY-PRO TOOL COMPANY
DIVISION OF CONTINENTAL SCREW CO.

modern machine shop 31

Experience—the added alloy in Allegheny Ludlum tool steels



Careful addition of sulfur to melt guarantees typical sulfide distribution, as shown in photomicrograph of longitudinal specimen of EZ MACHINING tool steel.

Sulfur addition to melt held to narrow range in Allegheny Ludlum's EZ MACHINING GRADES

Uniform, finely-distributed sulfides mean uniform machining, uniform high finish, uniform long tool life order after order

Adding sulfur, actually an impurity, to a tool steel melt to make it free-machining must be done with care and precision. That's why Allegheny Ludlum maintains an extremely close average range in adding sulfur to its EZ MACHINING grades. But mere range, however narrow, is not enough. A-L has developed special techniques in adding sulfur and nucleating agents to produce the uniform, finely-distributed sulfides that characterize good free-machining tool steels.

A-L's extra care means you can standardize your machining operations from piece to piece and order to order. This reproducibility is reflected in uniform machining; uniform high finish; uniform long tool life.

For example, in the production of heels these machining properties in Allegheny Ludlum's EZ MACHINING steels minimize the costly "backing off" operation for back clearance of multiple teeth, eliminating complicated extra heat treatment. Lower residual stresses are set up, because the steel has a lower resistance to the cutting action. Naturally, hobbing is only one of the situations where these free-machining characteristics can benefit you.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier. ALLEGHENY LUDLUM STEEL CORPORATION, Oliver Building, Pittsburgh 22, Pa. Address Dept. MS-12

WVW:259

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country... Check the yellow pages every grade of tool steel... every help in using it

For more data circle 333 on Postpaid Card



↓ Use this Postpaid Card for requesting more information on products described and advertised ↓

READER SERVICE CARD

DECEMBER, 1958

**modern
machine
shop**

431 Main Street, Cincinnati 2, Ohio

Your Name—

Your Title_

Company Name _____

Company Address:

City-

Zone_

State_____

Products Manufactured

Number of Plant Employees

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue

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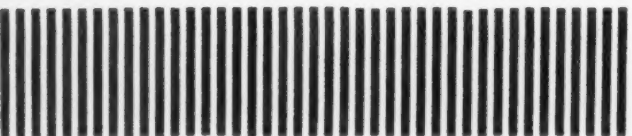
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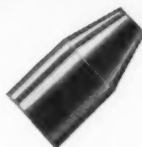
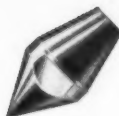
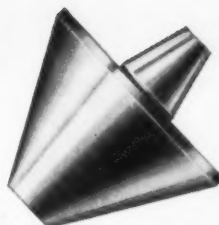
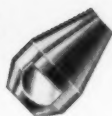
431 MAIN ST.
CINCINNATI 2, OHIO

FIRST CLASS
PERMIT No. 1702
CINCINNATI, OHIO





Famous Perfection
Grinding Live Center



H.S.S. and Carbide
Accurate Detachable Points



Expansion Compensating
Lathe Centers

ANNOUNCING THE FIRST COMPLETE LINE OF PRECISION-BUILT LIVE CENTERS

**INCLUDING 5 TYPES OF
EXPANSION COMPENSATING CENTERS**

- the only complete line
- the only guaranteed self-adjusting live center

INTRODUCING J & S Tool Company's complete new line of live centers with accuracy better than .0001", with these features:

- Guaranteed one year.
- Self-adjusting bearing take-up.
- RPM speeds up to capacity of present-day machines.
- Correct capacity rating.
- Hardened and ground throughout.

Write today for a free copy of the J & S Live Center Catalog.

J & S TOOL CO., INC.

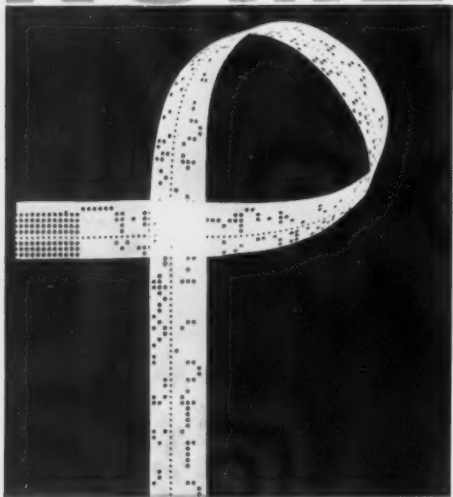
871 Dorsa Avenue

LIVINGSTON, NEW JERSEY

**J & S TOOL CO., INC., ALSO MANUFACTURES FLUIDMOTION WHEEL DRESSERS
CLAMPS • NO-BEND MILLING ARBORS AND CLAMPCUT MILLING VISES**

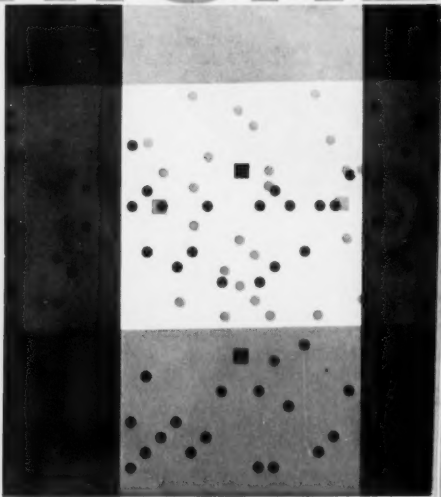
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NUMERICAL



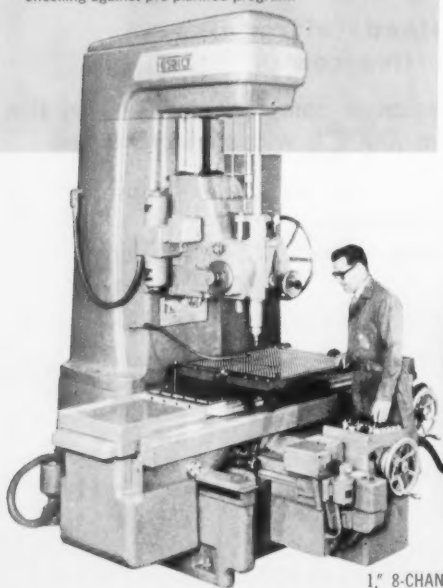
1" 8-CHANNEL COMMUNICATIONS TAPE

Inexpensive, widely used throughout industry, these tapes may be prepared simply on a Flexowriter or similar equipment, usually by the Production Engineering Dept. Provides a typewritten record automatically for easy checking against pre-planned program.



4" MYLAR PLASTIC TAPE

Least expensive of the generally accepted tape systems, particularly suitable for smaller shops machining parts with relatively few holes. Tape can be prepared easily by shop personnel.

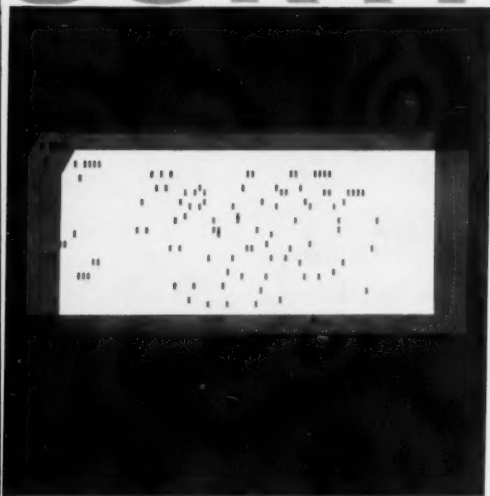


1" 8-CHANNEL COMMUNICATIONS TAPE

4" MYLAR PLASTIC TAPE

CONTROL

for Fomatic JIG BORERS and JIG GRINDERS



PUNCHED CARDS

This system can be integrated with card systems already in use by your company. Each job is programmed in a "deck" of cards; provides great flexibility, since an operation can be added or eliminated simply by making a new card or removing an old one.

Any tape or card reader can be used to control a Fomatic Jig Borer or Jig Grinder. And because the functions of the standard Fomatic are actuated electrically, numerical control can be installed in the field—economically!

Speeds and feeds are changed by controlling electro-magnetic clutches through relay contacts. Table and saddle position is determined by a measuring system actuated by direct reading dials. For numerical control, these dials are driven by a fractional hp motor.

On a Fomatic, you can program as many functions as you wish. Table X and Y positions (to .0001"), Feeds and Speeds, Spindle start and stop, Spindle feed start and stop, Spindle feed depth, Spindle head height, Automatic tool change. And only Fomatic gives you a visual numerical check of coordinate location plus operation sequence number.

Example of savings made with Fomatic numerical control. The illustration (left) shows one half of a mold with 900 cavities, each of which requires nine operations—a total of 8100! Time for the entire job was 100.25 hours, 25% of time consumed previously on a conventional jig borer.

Write or call today for complete information on a numerically controlled jig borer or jig grinder to improve your production method.

Buy a Fomatic today—add Numerical Control tomorrow



PUNCHED CARDS

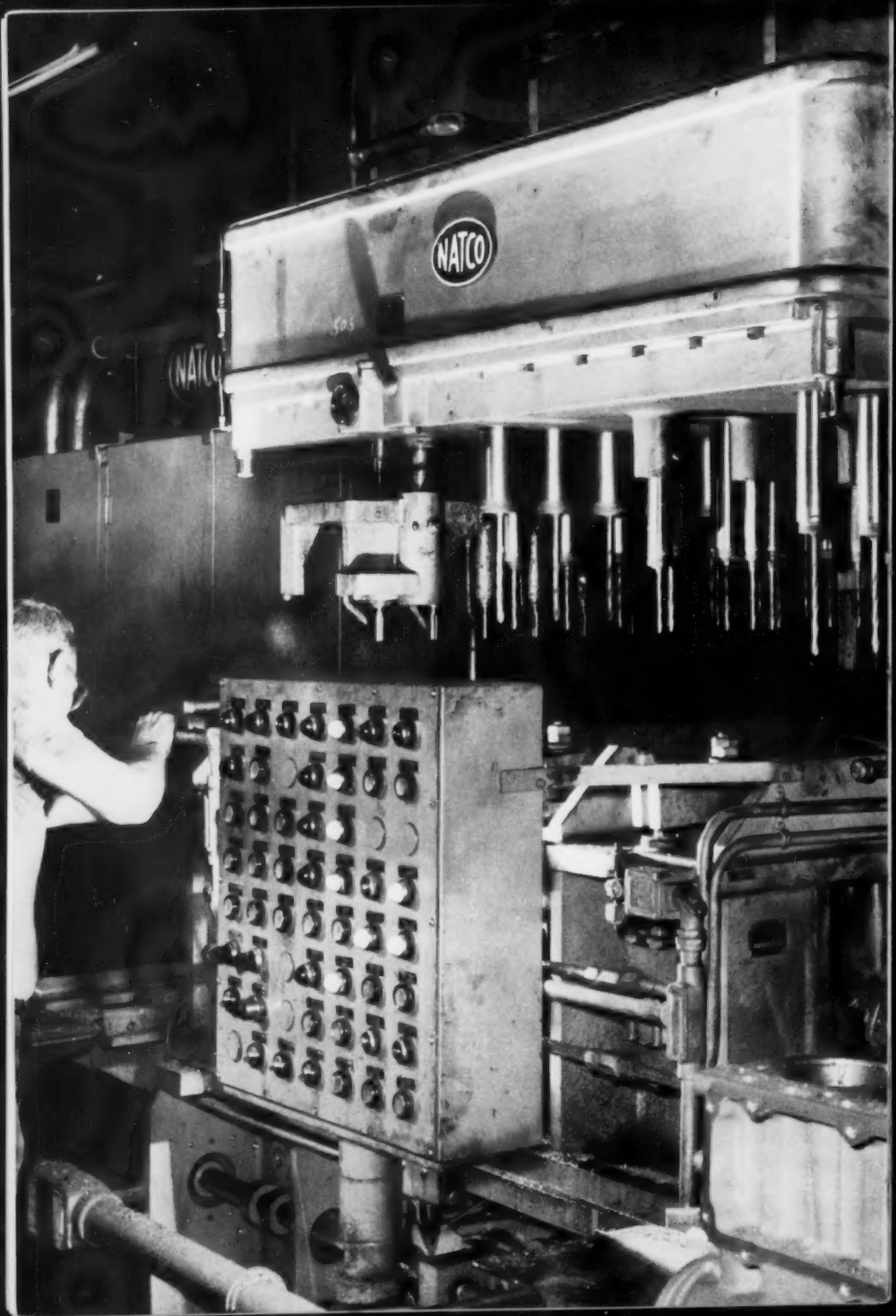


Get a Proposal from

FOSDICK

THE FOSDICK MACHINE TOOL CO.
CINCINNATI 23, OHIO

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Unique Natco Transfer Machine

One head does the work of four

New Static Control saves space, maintenance

Although it takes up only 125 sq. ft. of floor space, this Natco performs more than 36 operations per minute!

This unique machine combines four working stations under a single compact head — 32" x 57", incorporating 31 spindles. Fixture is Natco 6-station straight line index type. With a part in each station, the following operations are accomplished simultaneously:

Station 1: Load Station 2: Drill 7 holes Station 3: Drill 5 holes Station 4: Chamfer 7 holes, drill 5 holes Station 5: Tap 7 holes Station 6: Unload

Used for the first time in a transfer machine, static controls provide a new degree of reliability. Because there are no moving parts, maintenance is virtually eliminated. And this panel occupies 30% less space than conventional controls require.

Combining operations leads to economy — in this case, saved floor space, easier maintenance and all the advantages automation offers.

Call your nearby Natco representative. He can tell you how a Natco can reduce your costs, improve your methods.

Multiple-spindle drilling, boring, facing and tapping machines. Special machines for automatic production.

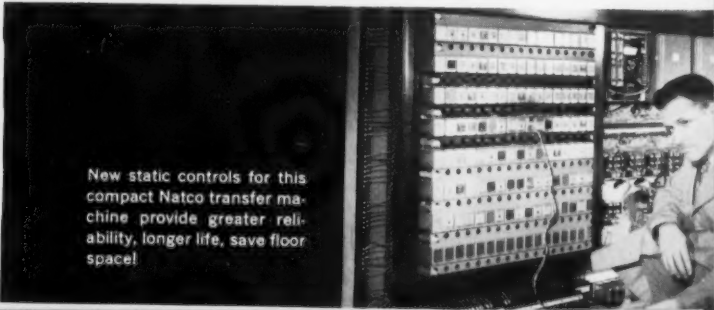
NATIONAL AUTOMATIC TOOL COMPANY, INC.

Dept. 305-A, Richmond, Indiana

Natco offices in Chicago, Detroit, Buffalo, New York, Boston, Philadelphia, Cleveland and Los Angeles. Distributors in other cities.

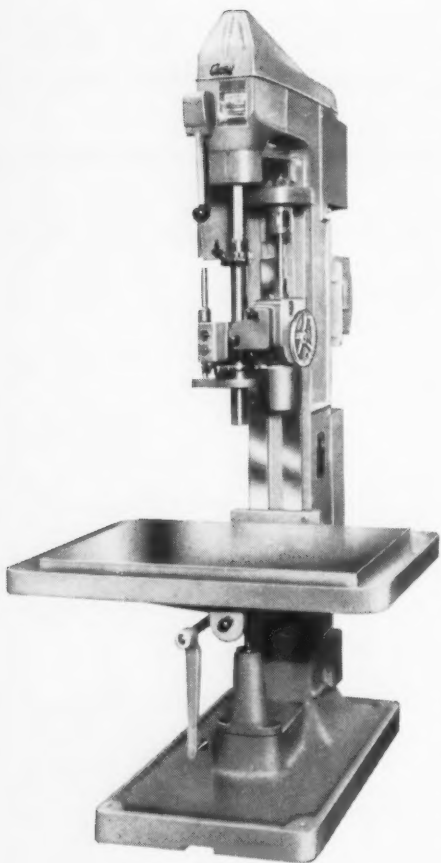


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New static controls for this compact Natco transfer machine provide greater reliability, longer life, save floor space!

automatic cycle drilling machine



You can chop your time costs with automatic set-ups on this new Avey machine, and still take advantage of the low cost and flexibility of a standard unit.

Adjustable rapid power traverse, feed, and rapid return of the spindle are the features which permit automatic transfer or rotary index fixturing.

At the same time, you get adjustable feeds, speeds, table travel, head travel, and Avey's advanced spindle construction.

The machine is available with No. 2, 3, and 4 Morse Taper; 1 to 3 HP motors; single or multiple spindles. Your request for additional information will be promptly answered. Avey Division, The Mott & Merryweather Machinery Co., Box 1264, Cincinnati 1, Ohio.

another first by



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Wheels coated with ALUNDUM abrasive give a high polish faster, for less money. In setting up the wheels, the high capillarity of this polishing grain improves and speeds up the wetting process with glue or cement.

Set your polishing wheels up to save!

ALUNDUM* abrasive brings you the value-adding, cost-cutting "Touch of Gold"

Norton abrasives are first choice in many plants for the widest range of polishing jobs. Where especially long life is desired the blocky shaped E₁ ALUNDUM B abrasive is extremely popular. Available in grit sizes 14 to 240. Where faster cutting action is required E₁₃₈ ALUNDUM R abrasive (sizes 100 to 240) is first choice. Both types are specially treated to give much greater adhesion with glue or cement.

Typical advantages common to all ALUNDUM polishing grains include:

- *Uniform grain shapes*, assuring fast, uniform cutting action.
- *Uniform grain sizings*, with no over-size grains to mar the finish, no under-size grains to loaf on the job.
- *High capillarity*, assuring the easy ab-

sorption of adhesive that means longer lasting, better performing set-up wheels.

The booklet "Setting Up Metal Polishing Wheels and Belts" contains valuable facts on the various types of ALUNDUM abrasive, and on the best means of preparing wheels. Ask your Norton Distributor for it. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries



G-355

Making better products...to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals
BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

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STANDARD BROACHES

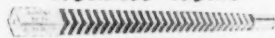
all from stock!



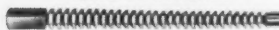
Minute Man KEYWAY BROACH KIT

In one minute and for as little as one cent you can cut a keyway with this kit. For keyways from $\frac{1}{16}$ " to 1" in any bore from $\frac{1}{4}$ " to 3".

Minute Man



SQUARE BROACHES



HEXAGON BROACHES



New ROUND BROACHES

$\frac{1}{8}$ " to $\frac{3}{4}$ " squares and hex's; $\frac{1}{4}$ " to 1" round. Production Type Keyway Broaches also in stock.

The duMONT CORPORATION Greenfield, Mass.

MAIL FREE BROACH CATALOG AND PRICE LIST S describing Square Broaches, Hexagon Broaches, Production Type Keyway Broaches and Keyway Broach Kits to

Name

Company

Address

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40 modern machine shop

Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

DECEMBER 1-5 • American Society of Mechanical Engineers, National Exposition of Power and Mechanical Engineering, New York Coliseum, New York City. Information: International Exposition Co., 480 Lexington Ave., New York 17, New York.

DECEMBER 3-5 • American Institute of Mining, Metallurgical and Petroleum Engineers, Electric Furnace Steel Conference, Hotel Statler, Detroit. Institute headquarters: 29 W. 39th St., New York 18, New York.

DECEMBER 8-10 • American Nuclear Society, Winter Meeting, Sheraton-Cadillac Hotel, Detroit. Society headquarters: P. O. Box 963, Oak Ridge, Tennessee.

DECEMBER 10-11 • Industrial Truck Association, Annual Meeting, Roosevelt Hotel, New York. Association headquarters: 526 Washington Loan and Trust Bldg., Washington 4, D. C.

DECEMBER 28-31 • American Marketing Association, Winter Meeting and Exhibit, Morrison Hotel, Chicago. Association headquarters: 27 E. Monroe St., Chicago, Illinois.

JANUARY 26-27 • American Society of Lubrication Engineers, Gear Symposium, Morrison Hotel, Chicago. Society headquarters: 84 E. Randolph St., Chicago 1, Illinois.

JANUARY 26-29 • Plant Maintenance and Engineering Show, Public Auditorium, Cleveland. Information: Clapp & Poliak, Inc., 341 Madison Ave., New York 17, New York.

JANUARY 26-29 • American Society of Heating and Air Conditioning Engineers, International Heating and Air Conditioning Exposition, Convention Hall, Philadelphia. Information: International Exposition Co., 480 Lexington Ave., New York 17, New York.

December, 1958

ANOTHER CUSHMAN

AIR CHUCK

AT WORK

CUSHMAN CHUCKS,
a product of American quality,
labor and materials.

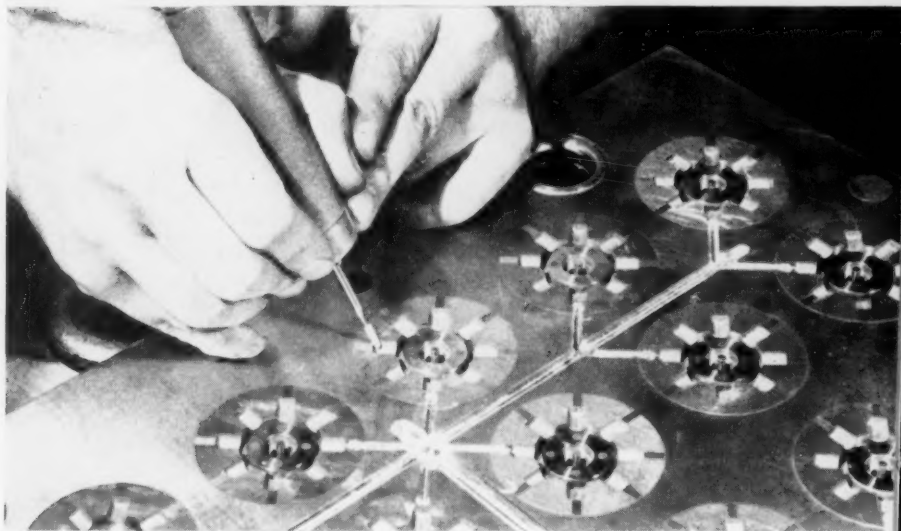
THE CUSHMAN CHUCK COMPANY

Sold through
your industrial
distributor.



hartford 2 conn.

32 ALUNDUM* Abrasive for your tool and die jobs



Here's how Norton keeps

"Making better products . . . to make your products better"

Norton mounted wheels are hitting new highs in grinding efficiency. Outstanding new developments in abrasives and wheel construction eliminate loading and glazing, assuring best possible results in:

TOOL AND DIE GRINDING

Norton mounted wheels with sharp 32 ALUNDUM abrasive and VBE bond are the very best performers.

Advantages: Wheels need no costly dressing; hold form; give constant cutting action — right down to the mandrel.

ROUGH GRINDING

For steel castings and weldments, mounted wheels of tough 44 ALUNDUM abrasive with VBE bond, and metal-mounted, are unequalled.

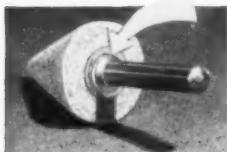
For snagging cast iron, wheels of sharp 32 ALUNDUM abrasive with VBE bond, and metal-mounted, outperform silicon carbide wheels consistently.

Advantages: Norton wheels give you the fastest cutting rate, with a marked increase of stock removed per wheel.

32 or 44 ALUNDUM Abrasive for your rough grinding



METAL-MOUNTING — Another Norton Exclusive — You throw nothing away but the mandrel!



Norton mounted wheels are so securely anchored to the mandrel — *you use all of the abrasive!* This

radically improved method of locking the abrasive body to the mandrel is used on most mounted wheels of $\frac{1}{16}$ " diameter and larger. Molten metal, injected into the abrasive recess at high pressure, does it — and does it fine!

Every Norton mounted wheel is accu-

ately trued *after mounting* on rust-proof stainless steel mandrels. Developed to increase the time-and-money-saving "Touch of Gold," Norton mounted wheels are stocked in approximately 200 standard shapes and sizes. See your Norton Distributor for prompt deliveries.

Or write to NORTON COMPANY, General Offices, Worcester 6, Massachusetts. Plants and distributors around the world.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

W-1880

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A B R A S I V E S

Making better products . . . to make your products better

NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals
BEHR-MANNING DIVISION Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

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December, 1958

modern machine shop 43

PARKER • MAJESTIC



PRECISION MACHINES

PARKER SPINDLES

FOR ANY MACHINE—FOR ALL APPLICATIONS



Following its development in 1915 and as a result of constant improvement through the years, the Parker Spindle has become one of the most widely used spindles in this country today on many makes of machines. The

demand for speed and endurance in grinding, precision boring and milling which the Parker Spindle makes possible has made Parker-Majestic Incorporated the leading manufacturer of precision spindles.

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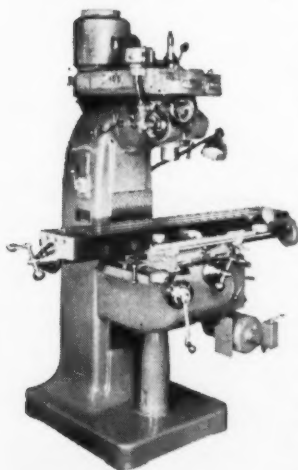
147 Joseph Campau • Detroit 7, Michigan
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Produce **MORE...**

Produce it **BETTER!**

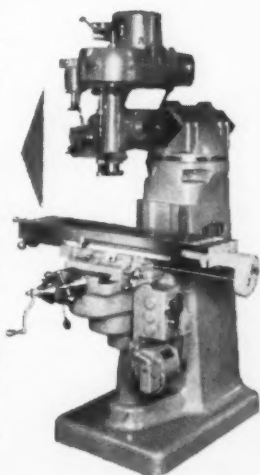
ON THESE IMPROVED ECONOMICAL INDEX VERTICAL MILLS

Super
"55" MILL



1½ HP Head or optional 2 HP with continuous duty motor gives 50% or more capacity . . . More rigidity, more accuracy . . . Increased horse power and dynamically balanced Cast Iron Pulleys and Drive System afford improved production capacity . . . More weight in the column, heavier ribbed column, heavier knee, heavier saddle.

"45" MILL



Unique square design of overarm affords more rigidity, greater accuracy . . . Provides extra range and capacity . . . More power at the cutter. No adjustment required on overarm and head after use . . . No need to re-indicate head after moving overarm . . . Speed range with nine changes makes possible the use of high speed or carbide tipped cutters to best advantage.

INDEX MACHINE Co.

544 N. MECHANIC STREET

JACKSON, MICHIGAN

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December, 1958

modern machine shop 45

FAST, VERSATILE 2-in-1 BENDER

For Experimental,
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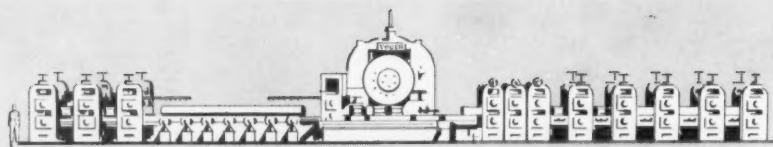
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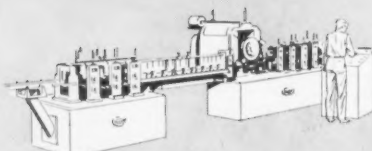
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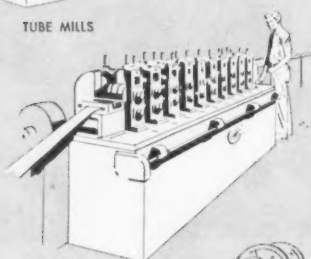
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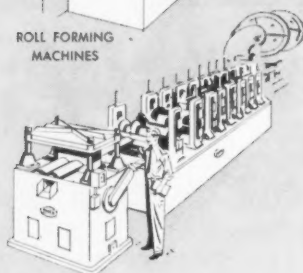
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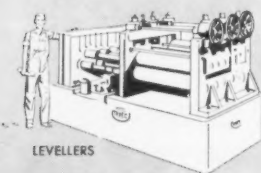
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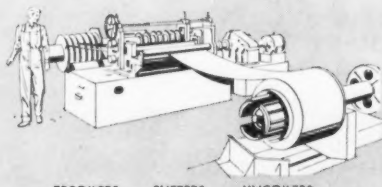
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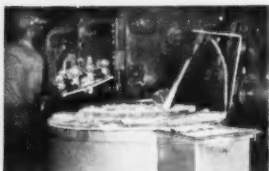
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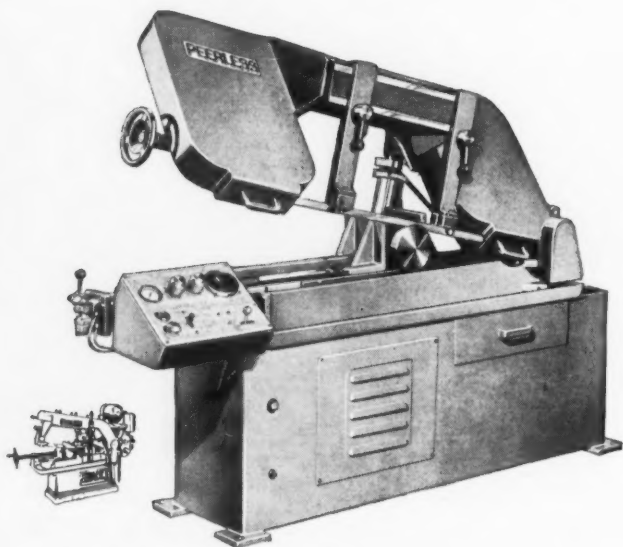
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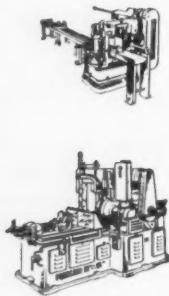
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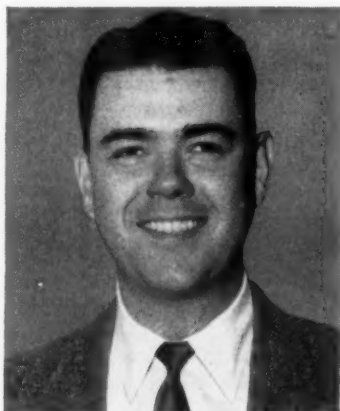
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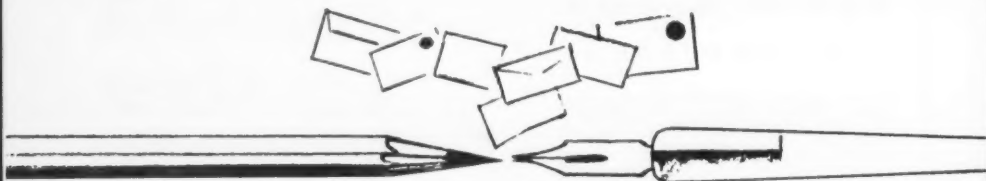
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OVER THE EDITOR'S DESK . . .



TAX VERSUS GROWTH

A steel industry financial executive said last month that American industrial growth will be "greatly retarded" and the free enterprise system lose prestige in the world battle of ideologies if tax laws are not modernized with more realistic depreciation allowances so that corporations can provide for the replacement of worn-out equipment and for growth.

Russell L. Peters, financial vice president of Inland Steel Company and chairman of its finance committee, said that a recent delegation of steelmen to Russia found the rate of progress in steel production there much greater than in this country. The report of the delegation is a warning.

Present tax regulations allow a corporation to charge against production only the original cost of equipment used up. In the case of equipment purchased as much as 25 years ago, it can only be replaced at three times the cost, Peters said, and will cost five times as much in another ten years if the inflationary trend continues as he fears it will.

The manufacturing corporation has no real alternative but to raise prices enough to make up the difference between what the govern-

ment allows it to charge off as depreciation of equipment and the actual cost of new equipment. The price increase must in fact be twice this deficiency, he said, because of the 52 percent corporate income tax.

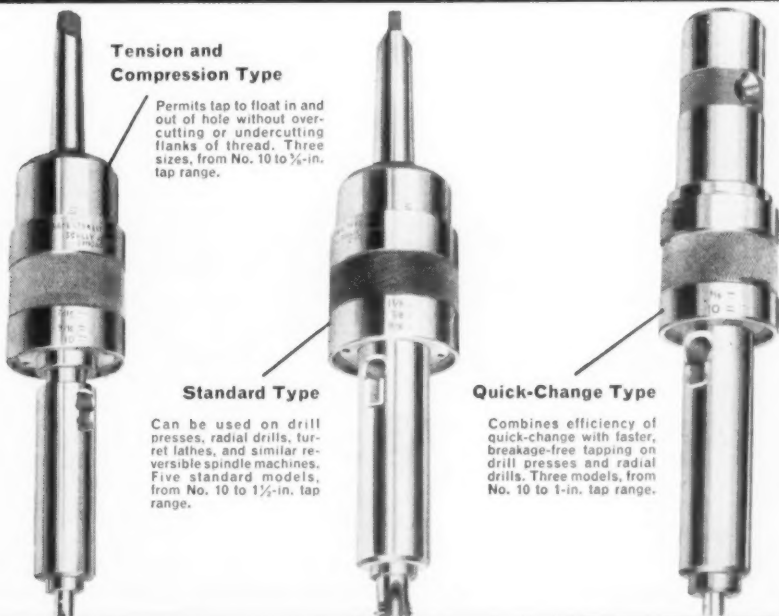
"It is hard to rationalize," he said, "a tax that must be collected on the funds which are needed to replace and maintain present production capacity."

"We like to think," he continued, "of the American economy as we have always known it; as a dynamic system unparalleled throughout the world. But how can you contemplate the maximum growth unless you first of all establish a sound base for expansion? That base must be a tax policy that will make it possible for you to keep secure that which you already have."

Several methods of dealing with depreciation of manufacturing facilities in an inflationary economy have been suggested, Peters said, the most sensible in his opinion being to permit an allowance to be calculated for tax purposes on replacement cost. Under this system, he explained, the original cost would be re-evaluated each year on the basis of an index kept by an appropriate governmental agency.

Peters predicted that inflation

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would continue. This country switched about 1940, he said, to an inflationary economy which had its origin in government policy and in laws that have given to powerful labor unions a tremendous bargaining strength. Inflation is present, he said, at any time when the increase in the costs of production exceeds the gain in productivity.

"We have just experienced a brief recession," he went on, "and we would like to feel that many of the inflationary excesses of recent years have been corrected. Such an assumption, however, would be overly optimistic. I'm afraid that the most we can say at this time is that the inflationary trend has been temporarily retarded."

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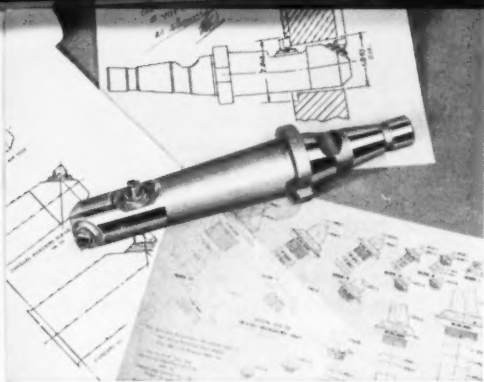
NOW OR NEVER

There is always a danger in lifting only certain remarks from the middle of a speech because of what a speaker may have said before or what he may have said later to expand or clarify his remarks. We would like to quote here, however, some remarks made by Roy C. Ingersoll of Borg-Warner Corporation and suggest that anyone interested in his full text send a request direct to him at 200 South Michigan Avenue, Chicago, Illinois, for a copy of his speech "The Need for Business Leadership in Politics."

We quote Mr. Ingersoll: "There is a point, as every prudent and responsible employer knows, where the line must be drawn on wage increases. Industry cannot continue indefinitely to boost pay scales every time a new contract is negotiated. It has become increasingly hard and often impossible to do this despite the technological advances and the large expenditures for new machinery and equipment.

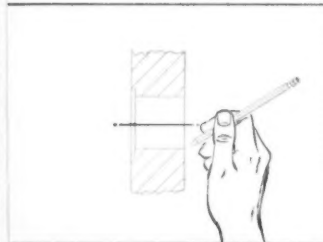
"When higher wages outrun increased productivity the worker is taking money for services he has not delivered. Thus a new element of cost is added to a product—a fictitious cost which represents no equivalent in value. Just as sure as night follows day, this results in higher prices and inflation which has reduced the value of the dollar and therefore has distorted the savings, the purchasing power and pensions of all Americans in all walks of life. Rising prices do not create inflation. They are caused by inflation. As I have heard it put, Price increases cause inflation like wet streets cause rain.

"I feel that it is high time that we business men cease to be shrinking violets in the political field. We must learn to grow in this field as we have learned to grow in business. We are not now entirely politically alert. The opportunists among the politicians make capital of this lack of alertness. Because we have not sold the very great virtues of our free enterprise system to all the voting public of this country, the politicians have decided that we are an unpopular minority—and unfortunately they rally to the support of our detractors."

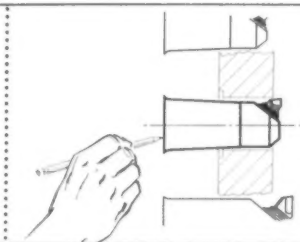


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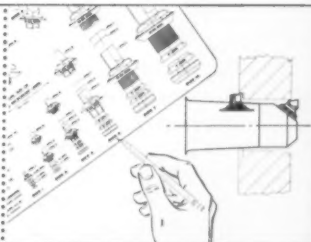
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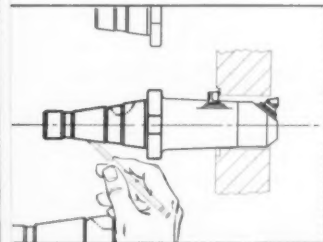
1 Make a full scale layout of bore to be produced, on tracing paper.



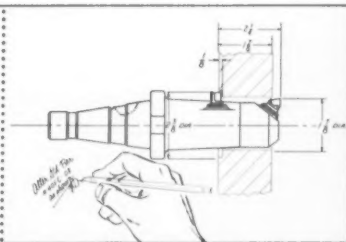
2 Place layout over standard bar nose templates. Select and trace the most suitable bar nose.



3 Select suitable Microbore Unit from template and trace in position for added tool station.



4 Trace the desired shank on boring bar, using shank template.



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MACHINE TOOLS AT CROSSROAD?

The concept that we need prepare only for a nuclear war is seriously jeopardizing the safety of the United States, according to A. V. Bodine, President of The Bodine Corporation, Bridgeport, Connecticut, and Past President of the National Machine Tool Builders' Association, in an address at the Association's Annual Fall Meeting.

"What assurance do we have," said Bodine, "that the next war, if any, will be a nuclear war? Do you remember back in the days before World War II when it was predicted that the next war would be fought chiefly with poison gas and germ warfare? Neither one was used. Isn't it possible that both sides would shrink from using atomic weapons in a future conflict, because the result would be absolute destruction?"

"To be properly prepared, we should be ready to produce at a moment's notice the requisite quantity of weapons to be used in non-nuclear warfare. This sort of production requires a good many machine tools."

Bodine stated that today machine tool sales are down 74 percent from 1956, 25,000 employees have been laid off, and the number of machine tool companies has declined from 403 in 1952 to 367 today. Because it is increasingly hard for machines built under the high American wage

scale to compete, as to price, with machines built under the low wage scales prevalent abroad, more and more American machine tool builders are putting plants in Europe.

"It is my firm belief," Bodine said, "that the machine tool capacity of the United States has shrunk below the margin of safety."

"Is our industry," concluded Bodine, "enmeshed in the web of reciprocal trade and low foreign wage rates, to go the way of watches and bicycles? Or is it, like shipbuilding and aircraft, to be regarded as a vital arm of national defense, and its capacity maintained accordingly? That is a question confronting our country today."

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BEST WISHES

Once again we reach that portion of the year when many of us will take time out to think and act more kindly toward our fellowmen. As we, the members of the staff of *Modern Machine Shop*, review the activity of these past months, we are grateful that most of the economic experts were wrong in their predictions of a full-blown depression. We found the months exciting and challenging and not at all depressing as some of the experts would have had us believe they should have been. And because we are grateful we would take this opportunity to express our appreciation to the advertisers who make the publishing of this magazine possible. Our wish is that all of you may enjoy the best of health and happiness this Christmastide and prosperity in the coming year.

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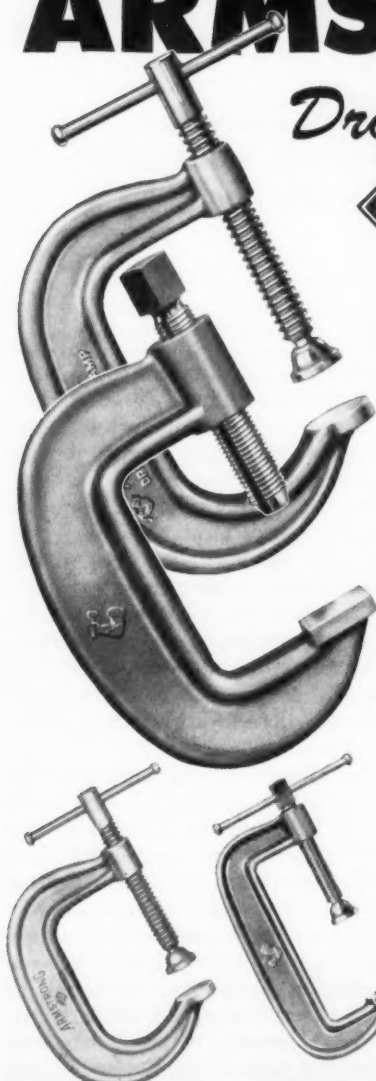


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HOT FORMING on a P

Conventional 200-ton press brake is converted for high temperature forming of exotic materials employed in aircraft and missile production.

By DONALD P. TURNER
Chief Engineer, Thermo-Form Company, Inc.

The illustrations with this article show in detail how plant engineers at Thermo-Form Company, Inc., a division of Altamil Corporation, El Segundo, California, converted a conventional 200-ton Pacific press brake for high

temperature forming of the exotic materials now commonly employed in aircraft and missile production. This converted machine will brake form, contour, draw, size and stress relieve such materials as magnesium, Mag-thorium, titanium, hot work tool steels, and corrosion resistant steels at temperatures ranging upward to 1300 degrees F. When not in use for hot forming work, the hot platen structure can be easily removed so that the press brake can be employed in conventional work.

The Thermo-Form Company was originally established several years ago for the purpose of handling hot forming operations on 75ST and 14ST aluminum alloys. At that time, and because the high temperature forming range on these alloys was between 300 and 500 degrees F., shop equipment for accomplishing the work was not too critical. Oil bath heating of the parts and preheated dies would do the job. But when the newer, exotic materials began to enter the production picture, hot forming temperatures soared upward to as high as 1300

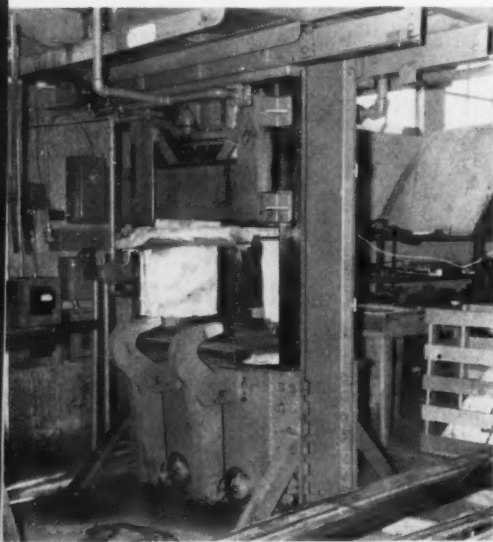
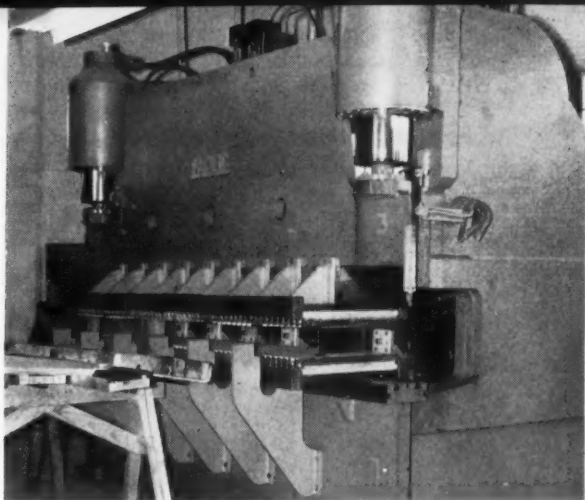


Fig. 1—Initial hot forming research work was accomplished on this old 75-ton press.

n a Press Brake



Fig. 2—Overall view of the converted 200-ton press brake with hot platen structure installed.



degrees F. The old equipment was utterly useless for hot forming in these ranges. As a result, new equipment had to be developed which could maintain forming temperatures more common to the heat treat furnace than to operating shop equipment.

Our experimental work began with a small 75-ton hydraulic press (Fig. 1) of unknown ancestry. Hot platens, 24 inches by 36 inches in size, were fitted to this press between which the forming dies and the work could be placed, and hydraulic cylinders were added which would apply horizontal pressure against the side of the work to assure close conformity to the contours of the forming dies. Work with this experimental press (and this original experimental press is still used in some production work) indicated that it could be accomplished on a much larger scale. We chose a 200-ton Pacific press brake (Fig. 2) for the next conversion job, and modified it with hot platens which were similar to, but

an improved version of, those used on the experimental press.

To begin with, we found that the shut-height of the 200-ton press brake jaws would not allow for

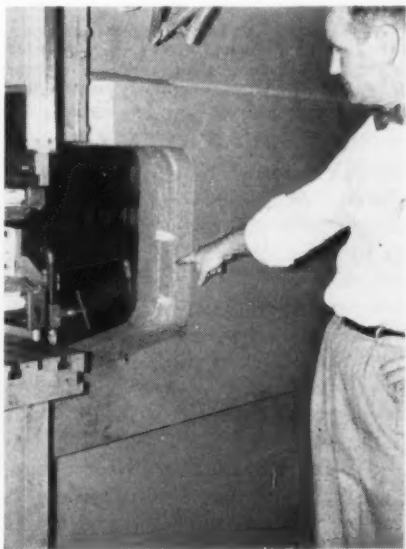


Fig. 3—Close-up showing how 7-inch segments were added to increase shut height.

"Our first job was to literally cut the press brake in two pieces and insert a 7-inch wide extension segment . . ."

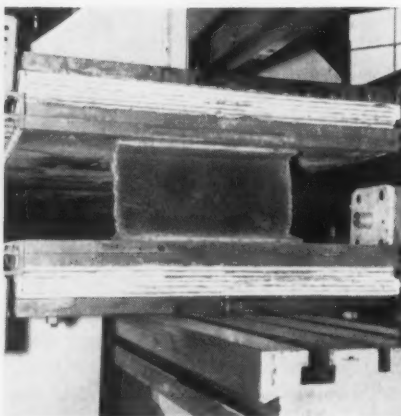


Fig. 4—Illustration showing platen construction. Each platen consists of two $\frac{3}{4}$ -inch thick steel plates with heating elements sandwiched between them; a 2-inch insulating layer consisting of alternate layers of $\frac{1}{4}$ -inch asbestos material, a 16 gauge steel sheet, and a sheet of aluminum foil to prevent radiation losses; and a backing sheet of 1-inch thick steel plate.

accommodating both of the hot platens with the forming die between them. Our first job then was to literally cut the press brake in two pieces and insert a 7-inch wide extension segment on both sides which would permit opening the jaws another 7 inches. During this same cutting operation, the throat was deepened by 12 inches. The 7-inch segments were welded in place and then lapped with a heavy reinforcement so that the press could still be operated at its maximum 200-ton capacity. Figure 3 details how these segments were added.

Our next job was to add the hot

platens and reinforce them in a manner to withstand maximum forming pressures. As shown in Fig. 4, each platen is made up of three sections, with each section 24 by 60 inches in size. The individual sections were made up by sandwiching the Nichrome wire heating element tubes between two $\frac{3}{4}$ -inch thick steel plates. The mating surfaces of the two plates were, of course, first machine grooves so that the heating element tubes would nest snugly in place. Each platen face is backed by a 2-inch thick layer of insulation, consisting of alternate layers of $\frac{1}{4}$ -inch thick asbestos insulating material, a thin 16 gauge steel sheet

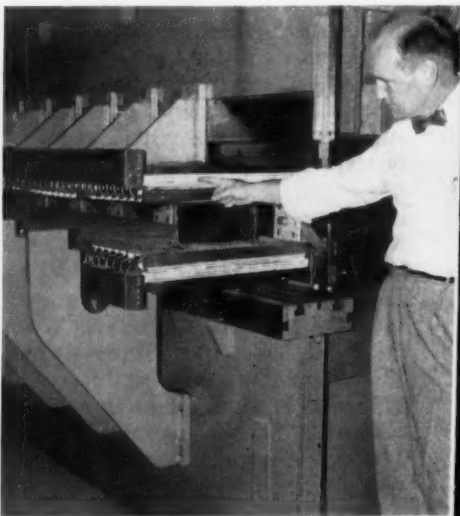


Fig. 5—View showing details of structures used to mount heated platens on press brake.

"... six hydraulic cylinders apply lateral pressure to the sheets being formed ..."

to distribute the pressures more evenly, and a layer of aluminum foil to counteract radiation heat losses. The insulating layer is backed by another 1-inch thick steel plate to which the platen supporting structure is attached.

The U-shaped heating tubes are each of 220-volt type, but two tubes are connected in series so that the series-parallel circuit can be feed by a 440-volt 3-phase power supply. The heating tubes are spaced throughout the length of each platen section so that a tube occurs every 2 inches. Thermocouples installed directly in each platen section face control the temperatures. One thermocouple lead regulates the heat on each platen section, while a second thermocouple lead "safeties" the installation by shutting off all power if the temperature happens to go too high. Thus, the danger of ruining a part made from expensive material is greatly minimized.

Figures 5 and 6 show in detail the structures used to support the platen faces and attach them to the press brake itself. The structure for the upper platen is of all-welded construction except for where it is bolted to the press brake. The supporting brackets for the front edge of the lower press platen are also bolted to the press brake frame so that they can be easily removed when necessary.

The six hydraulic cylinders shown in Fig. 7 apply lateral pressure to the sheets being formed to

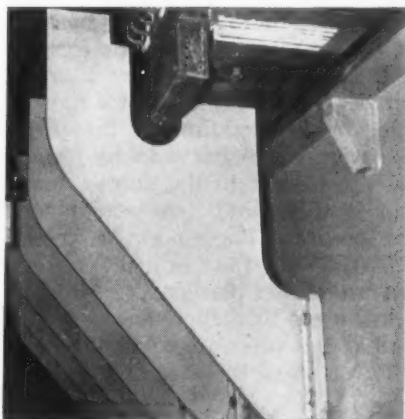


Fig. 6—Close-up view of the lower platen supporting brackets. Note that the brackets are bolted to the press frame so that the entire structure can be removed easily.

assure close conformity to the forming die contours. As can be seen in Figs. 7 and 8, the supporting structure for the outside of the lower platen is designed to offset the lateral pressure applied by the cylinders. The hydraulic cylinders are actuated by a hydraulic fluid system apart from the one used for the press. Experience showed that the same fluid system could not be used for the press brake and pressure cylinders without affecting in some way the operation of the press brake.

When in use as a hot forming machine, the press platens are first closed upon the forming die, then the current is turned on and both the platens and the die are brought to the required forming tempera-

"Heavier gauge parts are preheated to the correct forming temperature before being placed in the press."

ture. This requires from one to two hours, depending upon the mass of the die and the temperature required. Sometimes the heavier dies are preheated in an oven to shorten this preheating time in the press. Heavier gauge parts to be formed are preheated to the correct forming temperature before being placed in the press. These parts are inserted cold and then brought to temperature after placement on the die. Pressure is then applied as required, using the press brake platens and any or all of the rear pressure cyl-

inders necessary to assure close die conformity.

The platens are each in three sections, and any or all of them may be heated as required. Thus, current is conserved by not heating those portions of the platen that are not being used in a specific forming operation. The total current that is required when all of the platens are being used is approximately 192 kilowatts.

The high temperatures employed in these hot forming operations often become a final part of

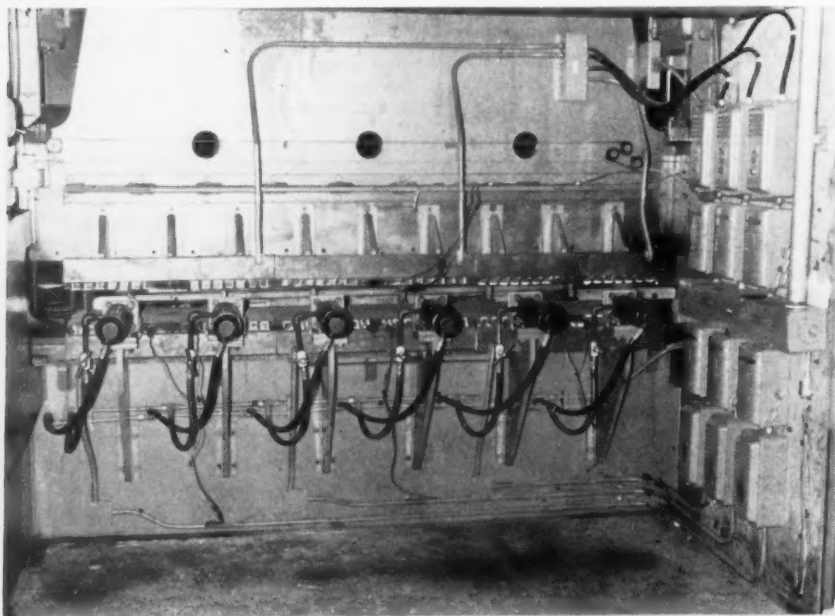


Fig. 7—Six pressure cylinders mounted at the rear of the press brake apply horizontal pressure on the part being hot formed to assure close conformity with die contours.

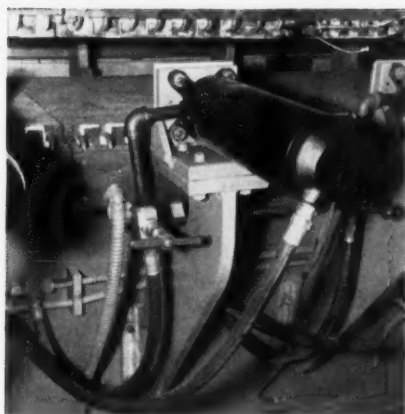


Fig. 8—Close-up showing how each pressure cylinder is mounted on the press brake.

the heat treatment of the material being worked. Thus, a part that requires a drawing heat treatment for a specific length of time is usually heat treated in a furnace for only a portion of the time required, then final drawing is accomplished while the part is in the heated press brake platens and while it is restrained by the die so that no warpage occurs. Of course, this is a highly variable situation and technical details would have to be ascertained for each particular type of material.

Insofar as we are aware, this is the only hot forming equipment of its type in use today. The press brake modifications were engineered, built, and installed by Thermo-Form plant engineers without recourse to prior designs. Each and all details of the installation had to be worked out from "scratch." The detachable nature of the hot forming modifications makes it unnecessary to tie up an expensive machine

while no hot forming work is being done. It requires about 4 hours to either remove or replace the modifications when a change-over is necessary.

All in all, we have found it an extremely useful and efficient development, and are continuing our research to discover more and more uses for it in extremely high temperature hot forming work.

★ modern machine shop ★

Modern Safety Practices. By Russell DeReamer. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 357 pages. Cloth binding, board covers. Price, \$7.00.

This book provides a practical guide to the latest methods of safety organization and administration. It is directed toward motivating managers and supervisors to a more active role in accident prevention. Through properly directed safety effort, the author believes supervisors can improve their roles as leaders. Thus, he stresses the need for designing safety programs to conform to modern management practices.

Comprehensive coverage of newly developed and tested safety methods is presented in four phases: the development of safe working conditions; job hazard analysis and personalized safety training; promotion of employee safety participation; and the enforcement of safety rules. By taking these four steps supervisors will control accidents, boost production, improve worker-manager relationships and sharpen their concepts of human relations.

Figures Don't Lie, But...

Two possible reasons for the quality control engineer's recently recurring difficulties in machining areas are discussed at length.

By C. W. KENNEDY

During the years many of us have learned to place considerable reliance on the quality control engineer's statistics. So often, with what looked like a simple bit of arithmetic, an uncomplex chart or a nomograph, he would accurately forecast the amount of scrap and rework which would come from a machining job, plus the yield in acceptable parts.

Occasionally, we would experience a situation where the screening of parts or their use at assembly revealed them as more off size or at variance with the condition than the statistical computation prophesied. Since the cases were isolated they were usually passed off as sampling errors. Just lately, however, such discrepancies seem to be on the increase, at least in machining areas. The quality estimate, the educated statistical guess, seems to be slipping and the question is beginning to be asked . . . why?

Two reasons might be considered as possibilities for the quality control engineer's recently recurring difficulties. They are considerably interrelated. Measurement is one and thinning tolerances another.

As far as the quality control engineer's actual calculations are

concerned, there is no reason to doubt them. His formulas and mathematics have been verified over and over again. We should remember, however, that his figuring is based on measurements, readings or "observations" as he calls them. Could it be that he has been getting inaccurate information more often than he used to? Even these million dollar computers which zip through marvelous calculations in lightning fashion have to be fed the right data in order to come up with the right answer.

One thing to do could be to take a trip out into any of the machining areas in the shop and see what's happening to measurement or, putting it another way, go out and reaffirm some suspected conditions. As an example, try "borrowing for a minute" micrometers from five owners at random and check each one for accuracy. First, of course, clean the anvils with the usual slip of white paper. Chances are dirt smears will show up four times out of the five.

Until indicating micrometers came in we never paid much attention to dirty mike anvils but the indicating micrometer has shown on its sensitive indicator that dirty

anvils can account for errors varying from half a tenth to a tenth and a half. Then, the book says, always make a zero check on a mike before using it. Here again one mike is liable to be right on the button but the other four mikes will vary in zero error from a tenth to a thousandth of an inch.

The two checks mentioned above are quickies which any mike owner could and should make regularly. But most of us are unable to readily make the next check—that for anvil parallelism—with a great deal of accuracy.

Anvils that have worn out of parallel may be the reason why the micrometer's zero reading is "off." Even though the zero setting is corrected, the mike with anvils out of parallel will still give inaccurate readings. The reason shows in Fig. 1, with the out-of-parallel condition exaggerated. The zero correction would be made when points *c* and *c'* come together. When a measurement is taken, however, will *c - c'* make contact with the workpiece or *b - b'* or *a - a'*, or anywhere between?

Anvil parallelism errors on micrometers have been found ranging anywhere from 5 millionths (negligible) to 500 millionths (0.0005 inch). While the parallelism error can be detected by suspending a smooth cylinder between anvil "high" points and watching it tip, or by exploring with a ball, probably the best technique is to use an optical flat, as illustrated in Fig. 2, and count the interference bands. A complete check up also includes the calibration of a micrometer for spindle and nut thread lead error, a function that is usually per-

formed with the assistance of gage blocks.

As the checking steps on micrometers in use proceed, the chances of finding even one completely accurate micrometer in five grow constantly slimmer and the accumulation of errors may readily add up to 0.0005 inch or worse on at least one mike without its owner having recognized the extent of inaccuracy trouble. So what, someone may say, a few tenths mike error doesn't cut that much ice. But maybe it does, where you add in the customary error which results from "heavy handling" a mike.

Maybe not in times past but in this second half of the twentieth century most tolerances for metal cutting and forming like 0.010 inch and even 0.005 inch seem to be taking on the worm eaten appearance

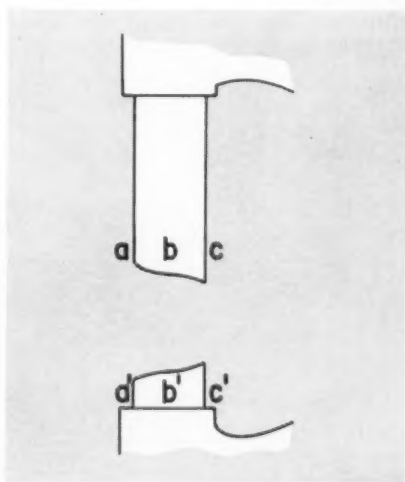


Fig. 1—Anvils that have been worn out of parallel may be the reason why the micrometer's zero reading is "off." This sketch shows out-of-parallel condition exaggerated.

"In some cases, looseness or play exceeding 10 millionths cannot possibly be tolerated."

of antiquity. The new generation of tolerances is showing up on blueprints in terms more like plus or minus 0.001 inch and smaller.

Modern electronically directed gadgets depend on the exact response of mechanical parts. In some cases, looseness or play exceeding 10 millionths cannot possibly be tolerated.

John Q. Consumer also seeks greater reliability and less repair charges. The machinist can no longer cut away a couple of thousandths of metal and let it drop on the floor. The customer now demands that leeway for improved wear and longer life, for noise and vibration-free operation in the car, appliance or

equipment for which he mortgages his future.

A gage error of 0.0002 inch steals only 2 percent of the tolerance if the latter is 0.010 inch, but it's 20 percent—grand larceny—where the tolerance is 0.001 inch.

We can make this idea graphic by using the quality control engineer's familiar frequency distribution curve, as shown in Fig. 3. Suppose a machine has been overhauled (or replaced) so that it just has the capability, represented in the dotted line curve *A* in Fig. 3, to meet, say, a new 0.001 inch tolerance spread. Also suppose the so-called "just a few tenths mike error which cuts no ice" really amounts to 20 percent of this allowed tolerance. Such a worn back gage could allow the work to take an actual distribution shift like that illustrated by curve *B* in Fig. 3. The result would be oversize rework at least to the extent of area *O* in Fig. 3. Ask your quality control engineer to figure how many out-of-tolerance pieces this area represents if the distribution shifts 20 percent because of gage error.

While the micrometer has been used for the object lesson, because it is so familiar to us, the same sort of exploration among fixed gages, vernier instruments and other conventional measuring apparatus will uncover about the same ratio of culprits.

Now that engineering is putting tolerances on increasingly restricted

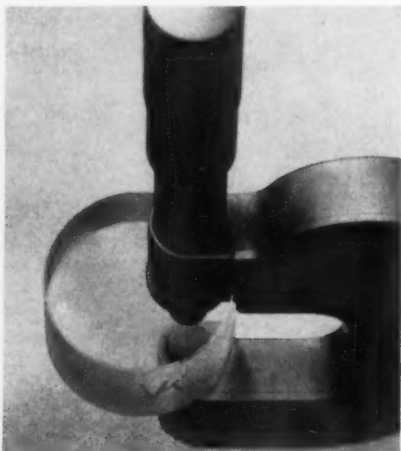


Fig. 2—Probably the best technique for detecting anvil parallelism error on micrometers is to use an optical flat, as shown here, and count the interference bands.

diets, they are thinning down to mere shadows of their former robustness. As a consequence, linear measurement turns more and more to indicating equipment and comparators, to air gaging and electronic devices. But with the refinement of measuring means we lose none of the potential chances for measurement errors, in fact quite the contrary sometimes.

The natural tendency is to build greater accuracy into modern precision instruments. Nevertheless they are potentially subject to the common causes of measurement error like wear, dirt, looseness, pressure and deflection.

For one thing, we now have the troubles connected with magnification. The closer the tolerance the more need for subdividing the inch not only into ten thousand parts but also into one hundred thousand or a million parts. To be able to discern such minuitiae, magnification in gages has been increased by various means. With a magnification of about 55 to 1, the micrometer makes a thousandth of an inch look as big as a sixteenth. Other instruments with say, 50,000 to 1 magnification blow up the millionth of an inch in similar fashion.

The point is that, while magnification makes the actual miniscule size difference discernible to the human eye, it also simultaneously and equally expands any measurement error. You don't have to be off the beam very far in order to make an error of a millionth of an inch.

We also now add the correct manipulation of the workpiece and gage as more important than ever

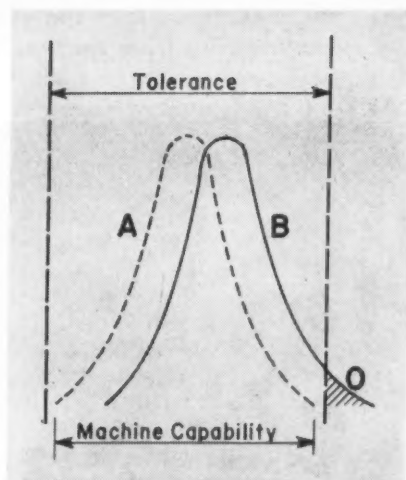


Fig. 3—Quality control engineer's familiar frequency distribution curve graphically shows how gage error steals from tolerance.

in securing correct measurements. Most of us contrive somehow to cock the workpiece or cramp the gage over enough to come up with the wrong answer.

With greater required precision and more instrument magnification to detect it, we learn how fast metal absorbs heat and expands, for instance, and how slowly it retracts to its normal dimension. We must be constantly on guard against temperature effects nowadays when we measure.

Because most gaging involves setting the gage to a master, transfer error is another modern troublemaker when you are trying to make and measure to close tolerances. The answer given by the gage of the comparator type will be a comparison between some standard and the particular piece that is being measured. To illustrate the possibilities,

"... we need to achieve the same measurement capability on the manufacturing floor that we have in the laboratory."

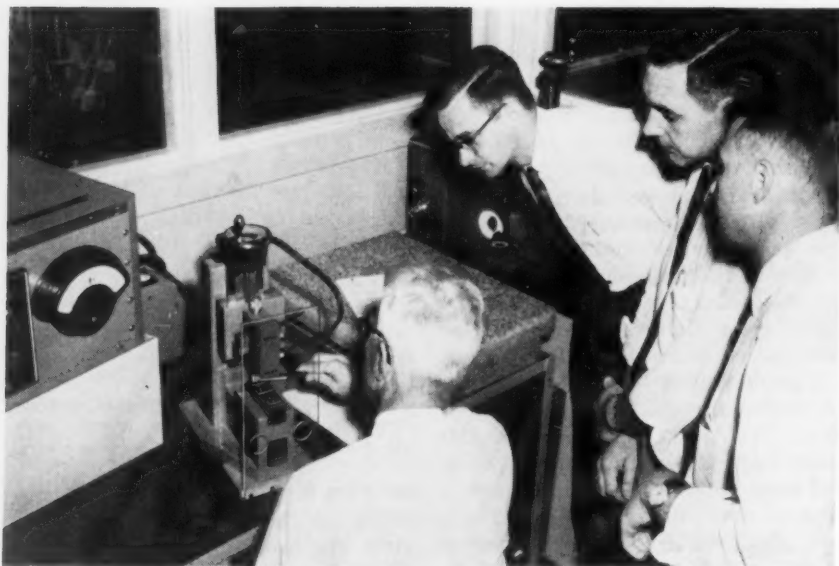


Fig. 4—Personnel from industry receive practical coaching in the technique of close tolerance measurement at precision gaging workshop held by leading gage manufacturer.

consider the precision measurement of a ground and honed hole whose I.D. is to be checked with some type of internal comparator or an air gage. The gage is set with a master ring which has been measured on an internal measuring machine. The latter had been set up with gage blocks. The gage blocks had been calibrated by the Bureau of Standards. From Washington to workpiece is a long distance for accuracy to hold.

Today we are constantly running into more and more situations where the complexity of the measuring method exceeds the skill

of the ordinary shop operator or inspector. Either by simplifying the measuring instrument or the technique or by training the shop man we need to achieve the same measurement capability on the manufacturing floor that we presently have in the laboratory.

The process is under way in many plants where the quality control engineer is adding new responsibilities to his portfolio. He is finding it necessary to set up means for verifying the "observations"—measurements—he is using in his formulas and math. In taking on these new responsibilities the quality con-

trol engineer usually feels the need for education in up-to-date precision measurement. This type of education is available.

Figure 4 was taken during the course of a precision gaging workshop held at Federal Products Corporation where personnel from industry receive practical coaching in the techniques of close tolerance measurement.

Along with more personal professional proficiency in the mechanics of measuring, the quality control engineer is finding himself involved in the selection of measuring systems and equipment suitable to the operations in his plant. Hence this new, necessary education in metrology means the study of what to use where.

Speaking of "where," a number of quality engineers have found

themselves picking up the subject of environment, probably mostly because it is often left lying around neglected by everybody else. Also there is a body of reports on the application of statistics to measurement results. After studying through such as these and then searching for "assignable causes" in measurement variation, we sometimes find environment a major source of trouble. An analysis of environment means looking into such measurement gremlins as drafts, sunlight, ambient temperature, and even barometric pressure, as well as into vibration and physically awkward machine and tool setups.

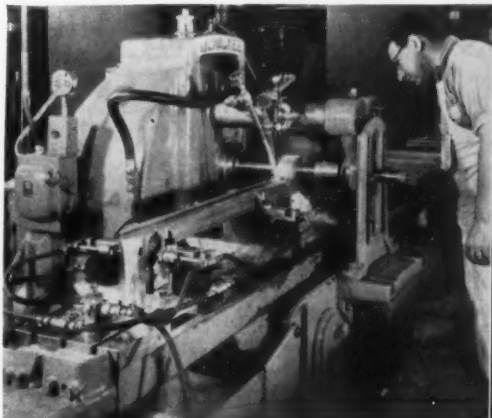
So it goes. The intent here is not to set off a chain reaction but to suggest, through a few examples, some of the measures that may be needed to keep figures from lying.

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Milling a Vacuum Column

Operator is shown herewith milling the channel on a vacuum column on a Milwaukee milling machine at Arrow Tool Co., Inc., Wethersfield, Conn. Six Mead V-7 air clamps respond instantly to the touch of a single valve by the operator, locking the workpiece in place along its entire length. This single operation replaces 18 separate hand clamping operations and assures equal pressure at all points, regardless of strain and vibration.

The vacuum column being milled is a major component of a magnetic tape device for use with an IBM electronic processing machine.



Clamping setup for milling the channel on a vacuum column used in magnetic tape unit of an IBM electronic processing machine.



Practical Pointers for Profitable

HEAT TREATING

In this second installment, the author continues his discussion of how to economically case harden steel.

By A. S. EVES
Perfection Tool & Metal Treating Company

Occasionally, parts that have been pack carburized and then hardened will show "spotty" hardness; some areas will be softer than others. These softer areas show up quickly if the piece is sandblasted, for they will be a little duller and rougher than the rest. This method is especially useful when checking objects of a shape that would be tricky to test with a Rockwell machine.

Steel tubing and leaded steels do not always quench out with uniform hardness. But if these jobs are run at a low heat, say 1550 deg. F. instead of 1700 deg. F., there will be a higher concentration of carbon in the case and that should help a lot. Molds that have been case hardened

in this fashion are said to take on a better polish.

Another aid to uniform hardness is to run the parts in a gas carburizing atmosphere with plenty of cracked ammonia, to produce lots of those hard nitriding needles in the case. Some alloyed low carburizing steels, when carburized, may fail to come up to the required overall hardness, due to what metallurgists call "retained austenite." In such instances, freezing at *minus* 120 deg. F. for six hours will usually improve the transformation and increase hardness.

Selective Hardening

The hardness, or the case, can be confined to just certain local areas.

"The carburizing of powdered metal parts offers some unique problems."

That is, carburizing can be stopped off by use of (a) copper plating at least 0.002 inch thick, or (b) a special copper-base masking paint, or both. Then only the exposed portions can absorb carbon, so the remainder will be soft after the quench.

Occasionally, however, there may be some carbon leakage. If the gas should creep through a pinhole or scratch in the protective covering, it will spread and the result will be a sizable hard spot. So here are two much surer methods:

1. Buy steel a little oversize. Carburize it all over but do no quenching—leave it soft. Next, machine off the carburized surface where you don't want hardness. Then reheat and quench the whole thing; the machined portion(s) will remain soft.
2. Or, machine the piece to reasonable tolerances, then carburize it all over but do not quench. Later, use an induction machine or flame hardening device to develop hardness only where you want it. Such treatment is known as "selective" or "localized" hardening. Low carbon steels lend themselves to it nicely, for no matter what method you use, the core of the steel will remain ductile and strong.

There are still other ways to accomplish pretty much this same thing. For instance, if you have a shaft with a thread on one end and you wish to keep the thread soft,

you can first carburize all over, then harden all over, and finally draw back the threaded end (only) in molten lead. Or, you might simply screw one or more nuts onto the threads at the start in order to keep the carbon from reaching them. Similarly, you can keep the bore and hub of a gear soft and free from carburization by merely clamping plates tightly over the hub ends.

Powdered Metal

The carburizing of powdered metal parts offers some unique problems. The material is so porous it soaks up carbon like a sponge, leaving little concentration near the surface for hardness. It is difficult to take hardness readings that tell how much has been accomplished; but experience shows that such



"... parts that have been pack carburized and then hardened will show 'spotty' hardness; some areas will be softer than others."

**"Do not use a liquid bath, for the salts
will penetrate and later will ooze out . . ."**

carburizing does improve the wear quality

Do not use a liquid bath, as in cyaniding or light-casing, for the salts will penetrate and later will ooze out as a whitish powder. No matter how often you grind the pieces, they just won't stay clean.

Manufacturers of powdered metal parts now find that a heat treater can contribute another benefit. For if instead of adding graphite to the original mix, the items be formed to the desired density and then carbonitrided, they will be much stronger.

Other Kinds of Case Hardening

This discussion would not be complete without mention of some methods quite different from any we've yet described. For example:

HIGH SPEED CASE is a salt bath which at 1000 to 1050 deg. F. adds perhaps 0.001 inch of carbon to the surface of a high speed cutting tool after the finish grind. The purpose is to improve the cutting quality. The low temperatures used do not cause distortion. Sometimes called "nitriding," this process should not be confused with . . .

NITRIDING which is usually done in a special furnace, and to steels of special analyses, including chromium, vanadium, or aluminum, which at 930 to 1000 deg. F. will combine readily with nitrogen from ammonia. Recently in Europe this has been done

without a furnace, by a process known as "glow discharge."

CHAPMANIZING is a patented process for putting a wear-resistant case on mild steel, using ammonia gas. The aim is to achieve a somewhat higher hardness with less distortion than with ordinary case hardening.

IHRIGIZING, a technique much like carburizing, puts a corrosion-resistant case on low carbon steel.

CHROMALLIZING, a sort of chromium diffusion process, does much the same.

SUPER-SCOTTONIZING is one of the privately controlled methods for case hardening stainless steels. The hardness is extremely high, the depth is quite shallow, and distortion or size change is said to be virtually nil.

MAKE SURE IT'S ON TIGHT DEARIE
I DON'T WANT MY PRETTY THREADS
CARBURIZED!



" . . . you might simply screw one or more nuts onto the threads at the start in order to keep the carbon from reaching them."

"It is well to emphasize that merely to carburize something doesn't necessarily mean to also harden it."

Finally, one might even mention induction and flame hardening, since those operations do produce a somewhat harder than ordinary surface. However, neither is intended to introduce carbon into the steel, so materials need not be low carbon. In fact, more often they aren't.

Tempering

Tempering (or drawing) of case hardened work frequently is omitted unless, of course, one wants more toughness or less than the "as quenched" degree of hardness. Nevertheless, a two-hour draw at 300 deg. F. is considered by many to be good practice.

How to Specify Treatment

You will have observed that all the common processes described

here, with very few exceptions, may be quite properly called *carburizing* or, even more broadly, *case hardening*. But, in order to avoid misunderstandings, it is well whenever you ask for any of these particular treatments to:

1. State the kind of steel.
2. Say what depth of case you require.
3. Tell whether or not you want it hardened.
4. If so, hardened all over or just certain areas?
5. State the degree of hardness or give the end use.
6. Indicate the straightness tolerance and the amount of stock left for grinding.
7. Say what surface condition you wish.

It is well at this point to emphasize that merely to carburize something doesn't necessarily mean to also *harden* it. If you wish hardening, say so. If you don't, then say: "Carburize only (do not harden)" and give the depth you desire. Then later, when hardness is wanted, show the degree and add the information that the piece(s) has been "previously carburized".

Of course, where hardening is wanted originally, the term "case harden" would include it.

A Warning

BEWARE! . . . Never use the expression, "pack harden." Why not? Because it has two quite different meanings. One of these is to



"... one might mention induction and flame hardening since these operations do produce a somewhat harder than ordinary surface."

"... carburizing is more than just a way of putting carbon into the surface of mild steel."

case harden, or carburize, in sealed pots.

But it happens that *tools* sometimes are packed in a very similar fashion but surrounded by a non-carburizing material such as pitch-coke or cast iron chips to keep them from scaling. The temperatures required might be very different, so you can see how confusion might easily lead to disaster.

Also get this clear—it's important. *When you hand your heat treater a job and ask him to case harden it, he will naturally assume it to be a low carbon steel; that is, below 0.30 carbon. If it isn't, don't fail to warn him ahead of time.*

Choice of Steel

Choosing the right steel for a job always is important. It isn't always

easy to draw a distinct line between steels that are suitable for carburizing and those which are not. Steels with 0.25 carbon or less, regardless of the alloys they contain, are good subjects for any kind of case hardening (except as we especially noted earlier). From 0.30 carbon upward we begin to encounter steels that are heat-treatable in themselves.

However, carburizing today is more than just a way of putting carbon into the surface of mild steel. The difference here lies in whether it is done by mistake, or intentionally and by an expert. Correctly handled, you can get from higher carbon steels physical properties for certain uses that are not obtainable in any other way.

A maker of springs says he finds a very good way to increase the fatigue life of springs is to carburize them slightly. Yet, the carbon in steel used for making springs is 0.50 upward to begin with.

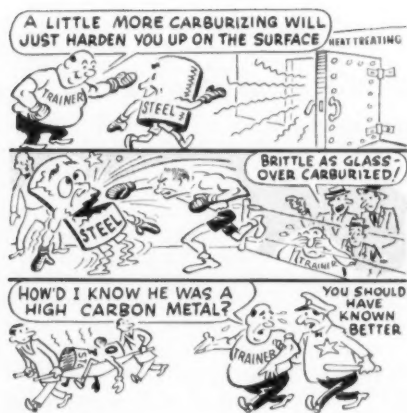
To carburize air-hardening tool steels can be of help if it is done right and the tools are used on light work. But it can also be harmful if done inexpertly and on heavy-duty tools whose edges might easily chip and spall off.

It may be important at times to think about a balance between wearability and strength of core. One can either case harden low carbon steels deeply, or select a medium-carbon steel (say 0.40 carbon) and put on it a light case—using lower,



"When you hand your heat treater a job, he will naturally assume it to be a low carbon steel; that is, below 0.30 carbon."

"Remember, medium and high carbon steels (broadly speaking) are through-hardening."



"... anyone who fails to specify that the steel is above the norm in carbon will be pinned to the stake if later it breaks . . ."

less hazardous temperatures. In fact, there seems to be a trend in this direction in such items as automobile gears.

As one wag says, plain low carbon steel carburized and hardened is like chewing gum wrapped in glass; and the chewing gum is no good unless you break the glass to get at it. Too much strength should not be expected from a soft core. After all, the core is one kind of metal, now overlaid with a quite different kind.

There often is a problem facing the heat treater when a manufacturer gives him a medium-carbon steel and expects high hardness. Such steel may be "neither fish nor fowl." That is, it may lack carbon to attain the hardness specified in the print, while carburizing

might demand overheating the steel.

Remember, too, medium and high carbon steels (broadly speaking) are through-hardening. So anyone who makes a mistake and fails to specify that the steel is above the norm in carbon, or insists on carburizing anyway, will be pinned to the stake if later it breaks — the structure will tell the story.

Now a hint about grain size. Steel is either coarse or fine grain. According to the standards of the American Society for Testing Materials, 1 to 5 is coarse and 6 to 8 is fine. Fine grain steels like ASTM No. 7 spell higher hardness, less distortion, better wear.

(To be continued in next month's issue)

★ modern machine shop ★

Unified and American Screw Thread Data. This twelve page bulletin with the exception of the center spread and the back page is devoted totally to listing the specifications for Unified and American screw threads. Included are brief discussions of interchangeability, designations, and allowance. Tables set forth the nominal size and threads per inch, series designation, class, allowance, minor, major and pitch diameters for both internal and external specifications. All internal and external threads up to and including two inches are included.

The digest is available at a charge of 75 cents from the Eastern Machine Screw Corp., 40-50 Barclay Street, New Haven 6, Connecticut.



1958

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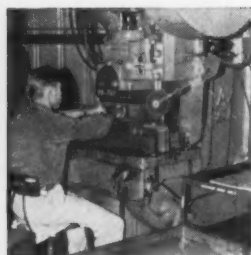
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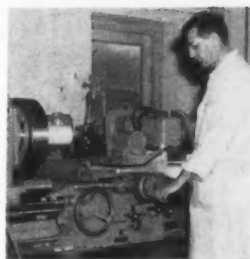
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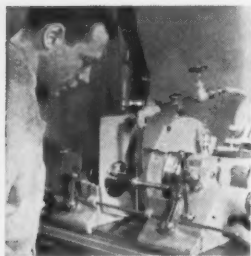


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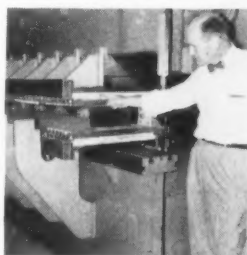
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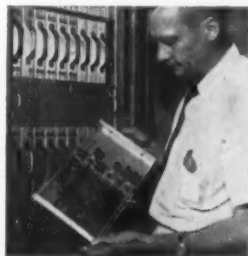
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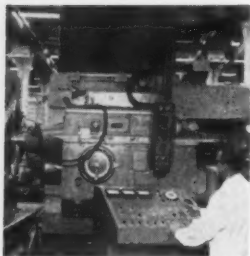
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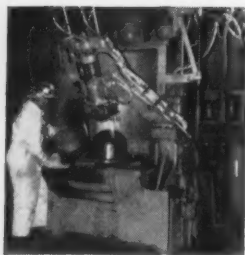
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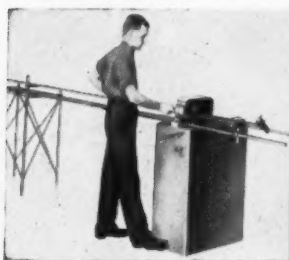
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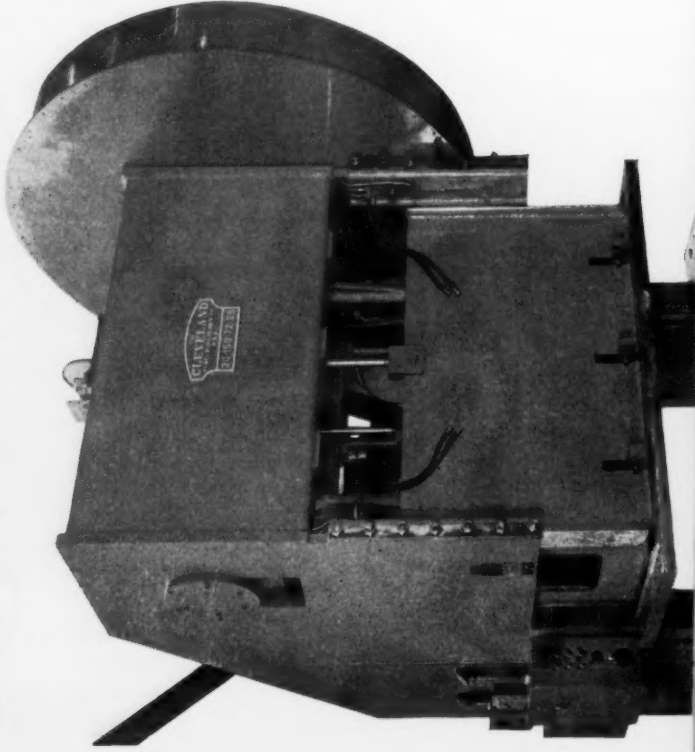
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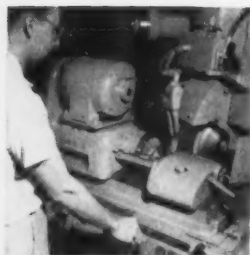
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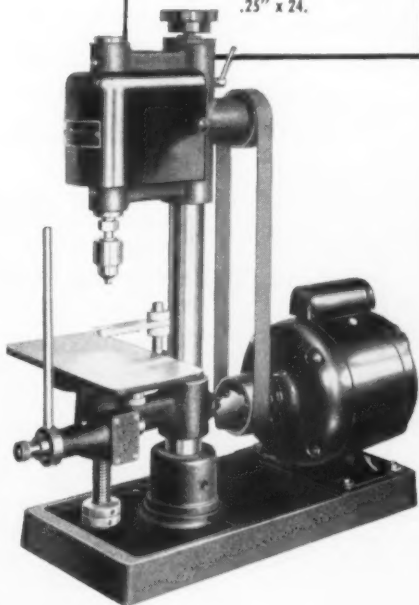
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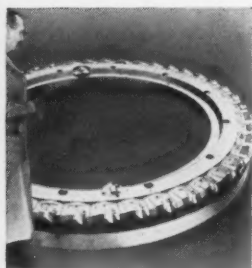
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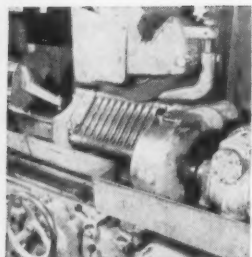
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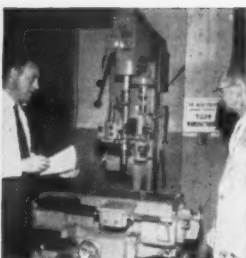
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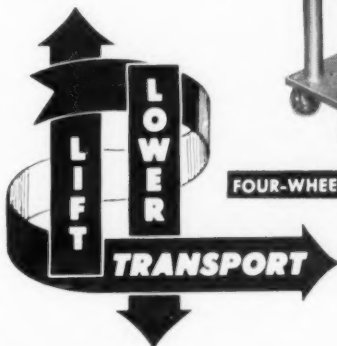
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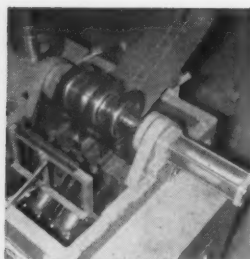
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Machining Stainless Steel

Tapping Type 304 stainless steel with 1/8 inch tapered pipe tap improved by increasing size of tap shank.

By G. J. STEVENS

Machining Engineer, Armco Steel Corporation

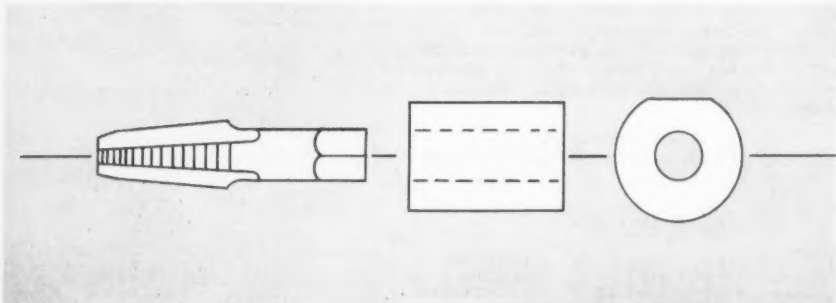
Problem:

A shop experienced short tap life and frequent breakage when tapping Type 304 stainless steel in a turret lathe. The conventional tap shank and holder bushing setup which was being employed was not nearly rigid enough to hold the tap;

consequently, the tap would twist in the holder or bushing and cause breakage.

Solution:

The tap shank was silver-soldered to a large size bushing made to properly fit the tap holder (see the sketch). This ended the trouble.

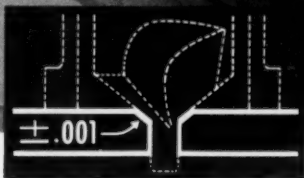
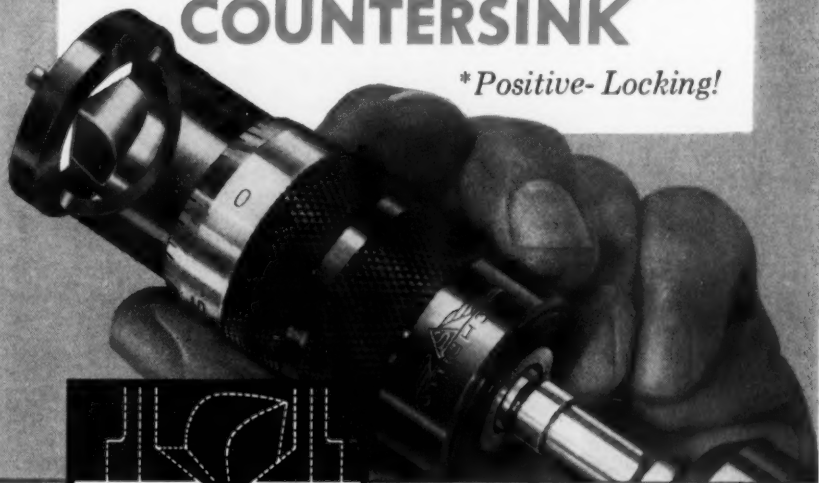


Sketch showing how tap breakage was eliminated in tapping Type 304 stainless steel by increasing the size of the tap shank through the addition of a large size bushing.

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*Techniques for increasing output with
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Power Saw Speeds Cutting of Aircraft Doublers

The FJ-4B Fury is a versatile jet fighter used by the Navy and manufactured by North American Aviation, Inc., at Columbus, Ohio. While the exceptional performance

of this aircraft makes it invaluable for combat missions, it also entails complex machining of highly stressed parts made from tough new alloys, such as 200,000 to 220,000 p.s.i. heat-treated steels. This has put an unusual load on the specialized millers now required in the production of airframe members.

The milling department at North American has been freed of one job by handling it on a DoAll power saw. The pieces involved are doublers—tough strengtheners for the gun blast panels on opposite sides of the aircraft nose. Several of these doublers can be seen in the insert in Fig. 1, which shows a view of the back side of a blast panel. The doublers are cut at an angle from 5/16 inch and 3/8 inch thick stainless steel plate, composition 303, condition A.

Formerly the doublers were cut from the rolled plate on a horizontal milling machine. This not only tied up a milling machine but was a slow operation with relatively high tool cost resulting from the slitting saws. The automatic milling machine only produced approximately 20 pieces per shift and wore out a slitting saw each shift.



Fig. 1—DoAll Model C-57 power saw fixtured to cut doublers. Inset shows gun blast panel utilizing stainless steel doublers.

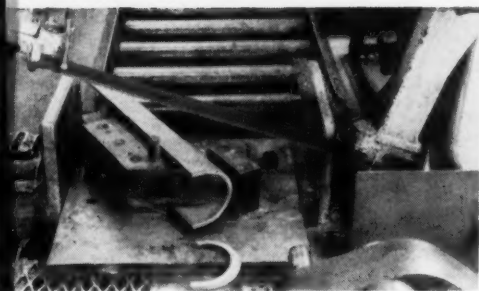


Fig. 2—Close-up view of fixture used for cutting doubler prior to "cropping" cut.

The Model C-57 DoAll Power Saw shown in Fig. 1 is primarily a cut-off machine for bar work of all kinds; but, because it is built with the power and rigidity for a high speed steel saw band, it was decided to try it for cutting the doublers. In order to adapt the power saw for this operation, it was only necessary to clamp the original milling fixture in vise of the machine.

Figure 2 shows a piece of rolled plate in position for the first "cropping" cut. The hex head cap screw is used to clamp the rolled plate against the locating block during the cutting cycle. After the "cropping" cut, the clamping screw is loosened and the plate is advanced the required distance for the first doubler. This distance is determined by a removable work stop against which the stock is manually advanced for each cut. After clamping, the saw is operated through its normal cutting cycle which produces one doubler, such as the one shown in the foreground of Fig. 2. A Demon high speed steel saw band, 1 inch x 10-pitch is used with coolant. The band speed used for this material is 150 feet per minute. For more data circle 1 on Postpaid Card

Special Tool Solves Hole Deburring Problem

The burr which is formed around any hole as a result of a drilling operation could be the cause of a great deal of trouble, especially so if the hole is drilled into an enclosed area such as a rear axle housing. And those burrs which sometimes hold the metal discs which are formed as the drill breaks through relatively thin-walled sections of metal are especially troublesome. If the burrs are not removed during manufacturing operations, they may later, when the housing is in service on a car, drop off and mix with the lubricant and be carried into finely machined gears and mating parts in the rear end assem-



Fig. 1—At Chrysler's Lynch Road Plant in Detroit, this operator now deburrs holes in banjo housings while they're still on the conveyor, thus eliminating removal, re-hanging and resultant fatigue. The job was enabled by a Cogsdill Burraway which replaced a conventional right-angle deburring tool.

More Production . . .

bly and thereby cause undue wear or damage to the metal surfaces of these parts.

The method of removing burrs from the back side of the through holes in the banjo face of the rear axle housings on the production line at Chrysler's Lynch Road plant

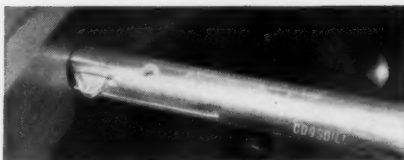


Fig. 2—One pass now chamfers both faces of the hole. On the in-stroke the spring-loaded cutter on the Burraway catches the outer face; on the out-stroke it catches the back face. Spring pressure on cutter is quickly adjustable in order to change amount of chamfer.

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consisted of using a right-angle drill which could be inserted through the hole and revolved. This application required that the housings be removed from the overhead conveyor line, placed in a specially designed clamping fixture where they could be rigidly held during the burr removal operation. This method was changed by the cooperation of plant engineers and a service engineer of Cogsdill Tool Products, Inc., who recommended the use of the Burraway tool shown in illustration Fig. 2.

The Burraway tool is designed

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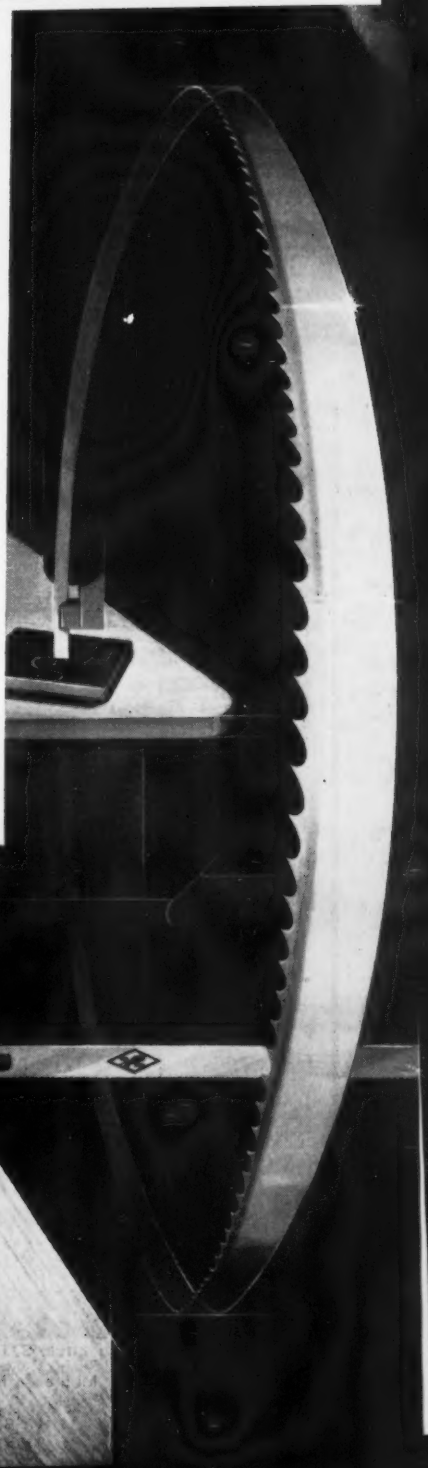
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to remove burrs from both outside and inside surfaces in one in-and-out operation. As shown in Fig. 1, there are ten $\frac{3}{8}$ -inch diameter holes around the banjo face of the housing which require deburring. With the use of the Burraway tool, air

motor driven, the housings remain on and suspended from the overhead conveyor line during the deburring operation. A pivoted, triangular shaped blade of the tool is held in cutting position by means of spring tension until the feed load against the work exceeds the present spring pressure. The blade then recedes into the arbor under feed,

cutting off the burr or chamfering the edge of a hole as it recedes. While the blade is inside the arbor, only a crowned surface contacts the workpiece, so that finished surfaces are not damaged by its passage. After its passage through the workpiece, spring pressure returns the blade to a cutting position to deburr the reverse side on the return stroke.

The amount of stock removal desired can be controlled by changing the spring tension on the blade, by means of a set screw located in the arbor shank of the tool.

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thickness varying from .005 brass to .250 steel can be trimmed. Shell sizes vary from metal ferrules for fountain pen barrels to electric refrigerator doors. Clean, flat, burr free edges are assured. Edge contours can be straight or curved, with multiple notches and projections.

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December, 1958 modern machine shop 101

More Production . . .

Cutting and Lubricating Oils Smooth the Way for More Production

That cutting fluids can improve the efficiency and economy of machine tool operations is being demonstrated at U. S. Electrical Motors, Incorporated. Until recently, the plant used a conventional soluble cutting oil, mixed in a 10-1 (water-to-oil) ratio, on a Milwaukee milling machine that cuts keyways in shafts for various models of motors made by the company. By switching to a heavy duty soluble cutting oil, developed by Gulf Oil Corporation, the plant realized several advantages of economy and machine tool performance. The heavy duty soluble oil can be mixed with water in a ratio of 35-to-1, instead of 10-1. Service life of this mixture is three months in contrast with three weeks for conventional oil. The better cooling properties of the new mixture have doubled tool life on the milling machine, according to U. S. Motors production personnel.

A thin, but extremely durable, anti-weld film formed by this oil between the tool and the chip permits holding closer tolerances more consistently on critical cutting jobs. Oil splashes on machinery and personnel have been reduced because the oil contains a non-foaming agent that prevents excessive frothing. This feature also lets the oil flow more freely to and from the work.

Numerous other difficult machining operations are performed

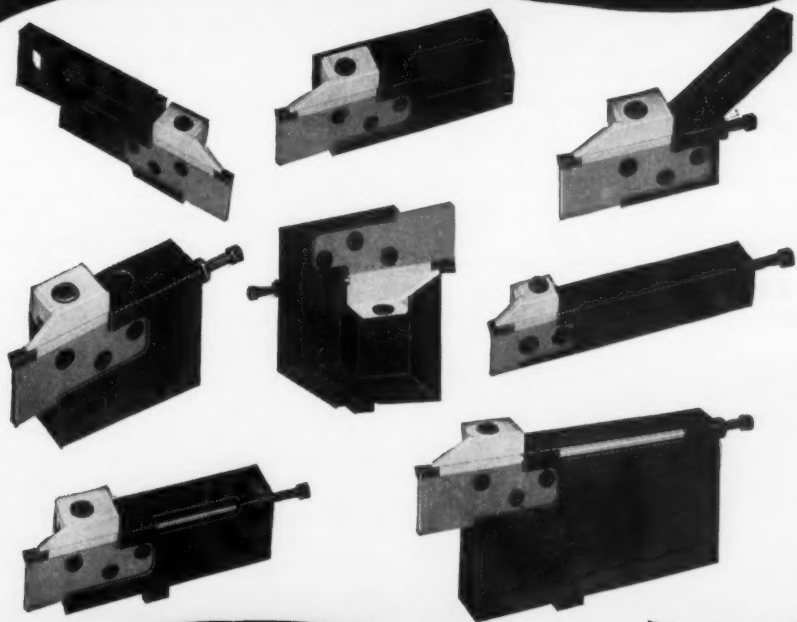
throughout this plant during the manufacture of the company's line of industrial motors. One of the toughest of these is the deep hole drilling of hollow shafts for motors. In this operation, the plant uses a dual-spindle Pratt & Whitney machine that simultaneously drills two shafts having hole diameters ranging from 11/32-inch to 1-9/16-inch. Shafts vary up to 25-9/16 inches in length.

Principal problem in the operation is heat. Experience by the plant has proved that Gulfcut 41C, a sulfo-chlorinated fatty oil, has the required properties to cool the work, save the cutting edges of the tool and remove chips. The oil is delivered to the cutting edge at a



Use of heavy duty soluble cutting oil has doubled tool life and improved tolerances.

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December, 1958

modern machine shop 103

More Production . . .

pressure of 200 lbs. per square inch. Forty gallons of oil per minute circulate through the system.

Tolerances and surface finishes are reported to be substantially better than those called for in specifications. In one case, 1045 hot rolled steel is being drilled $\frac{7}{8}$ -inch per minute at a surface speed of 350 feet per minute with a 1-9/16 drill. The inside diameter of the hole is being held within 0.002 of an inch of the drill size. Surface finish obtained is 45/50 micro-inch. Speed of each spindle on the machine is controlled by a Varidrive motor equipped with a brake that stops

the spindle instantly after the hole is drilled.

Lubrication is a vital factor in the operation of three high production 150-ton stamping presses at the plant. Bearing failure in these large machines would mean expensive lost time for replacement. Central lubricating systems force-feed Gulf Harmony 97 oil to all important parts of the presses. This is a non-corrosive lubricant that is inhibited against oxidation.

The three large heavy duty presses in the plant pierce rotor laminations for motors. Blanks are fed automatically by a hydraulic magazine.

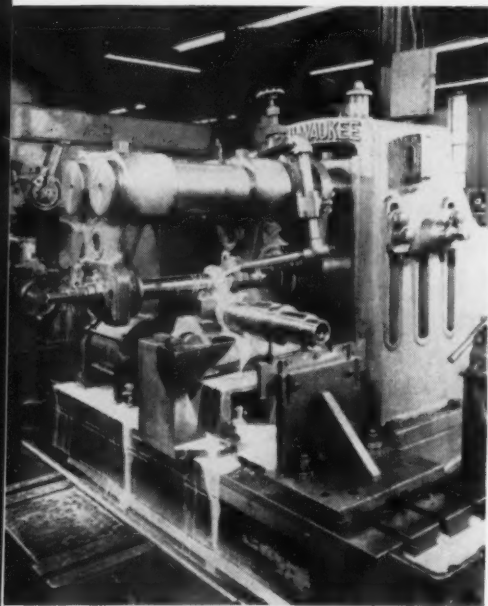
To keep the multiple-punch, piercing dies sharp, the 26 gauge silicon steel blanks are coated with Gulfcut 11A before the operation. This is a non-staining, non-corrosive mineral lard oil, giving excellent protection and long life to the tools, which are subjected to the extreme abrasive action of the silicon steel. Because of its non-staining characteristics, it is also an excellent oil for nonferrous metals.

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One Machine Does Work of Four Machines on Rocker Lever Boring Job

One machine with a single operator has replaced four machines and three operators on a rocker lever job at Cummins Engine Company, Columbus, Indiana. The revamping of facilities for rough and finish boring and facing the steel forging resulted in equivalent

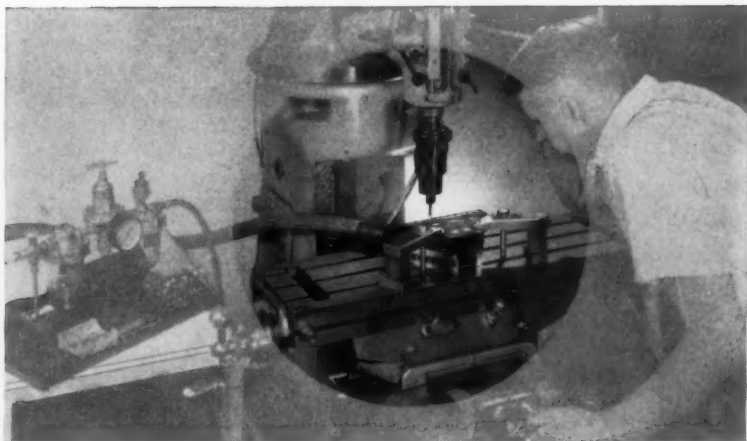


Use of a new fatty cutting oil improved the deep hole drilling of shafts for motors.

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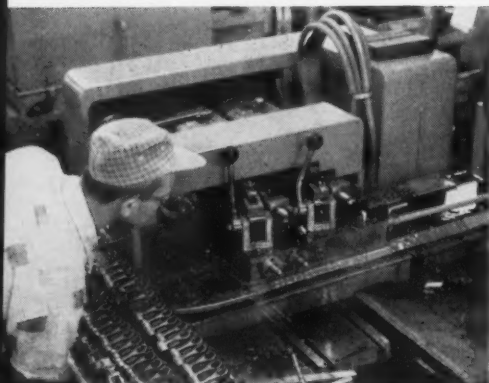


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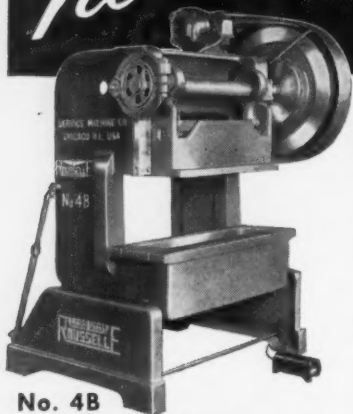
This three-spindle boring machine replaced four machines on rocker lever boring job.

production with one operator, freeing two operators for other work.

The three-spindle Heald Model 221 Bore-Matic designed for the job has a two-station hand clamping fixture which is indexed hydraulically in front of the three spindles. The two outside spindles rough the bore and finish the bottom face with a two-fluted cutter, while the center spindle finishes the bore only with a single point tool.

One part is completed at each cycle. With the fixture indexed front and both stations loaded, the front boring head roughs the bore and finishes the bottom face of part "A" while the center head finishes the bore of part "B." The operator

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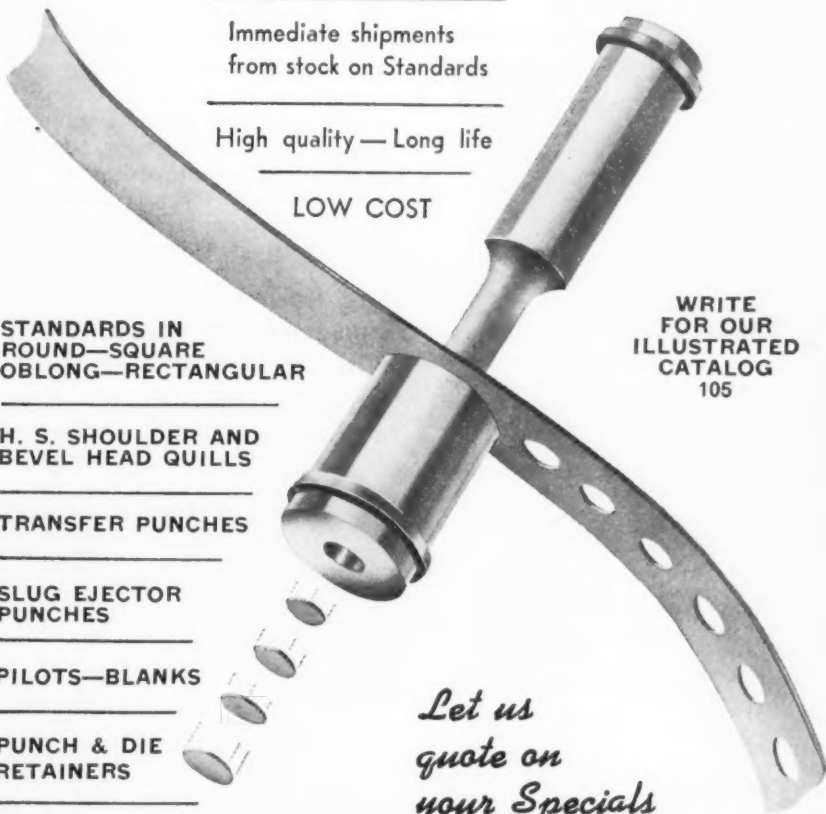
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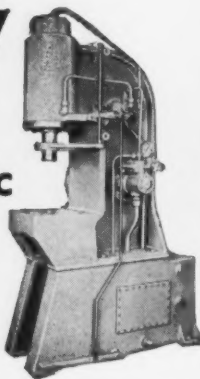
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More Production . . .

then replaces finished part "B" at the rear station with a new part and indexes the fixture to the rear where the center head finishes the bore of part "A" and the rear head roughs the bore and finishes the face of the new part.

In the setup previously used, forgings were rough bored on two single-spindle machines with one operator, finish bored on one two-spindle machine with a second operator and finish faced at a fourth machine with a third operator.

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Graduating from single-spindle to multiple-spindle equipment has increased the production of



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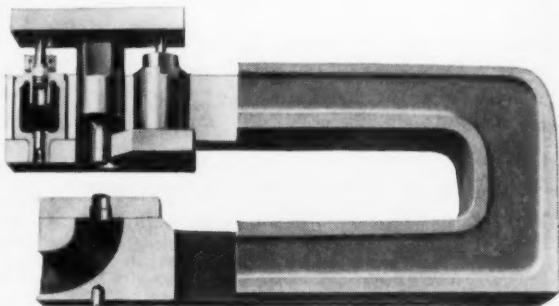
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More Production . . .

plug board plates from one pair to more than 16 pairs per eight-hour day at the Remington Rand Division of Sperry Rand Corp., Ilion, New York. Since these 7 x 10 x 0.187 inch aluminum plates are used pinned together in pairs in a computer, they are also drilled in

pairs to prevent matching up later.

The 24-spindle machine used for this job is a Natco H-6 driller arranged with an automatic air-operated indexing fixture. The 12 left-hand spindles drill one set of parts at high r.p.m. while another set is combination reamed and countersunk by the 12 remaining spindles running at low r.p.m. The finished holes have two diameters—

0.174 inch and 0.187 inch, each diameter calling for a tolerance of plus 0.002 inch, minus 0.000 inch.

In operation, the fixture indexes sideways four times to machine 24 holes. This is repeated 17 times to obtain 34 rows of holes. After each fixture cycle is completed, the finished pair is removed, the drilled pair is transferred to the right-hand position and a new set of parts is positioned for drilling. Parts are held in position by two air plungers. Floor to floor time, including clean up and reload, is 27.8 minutes.

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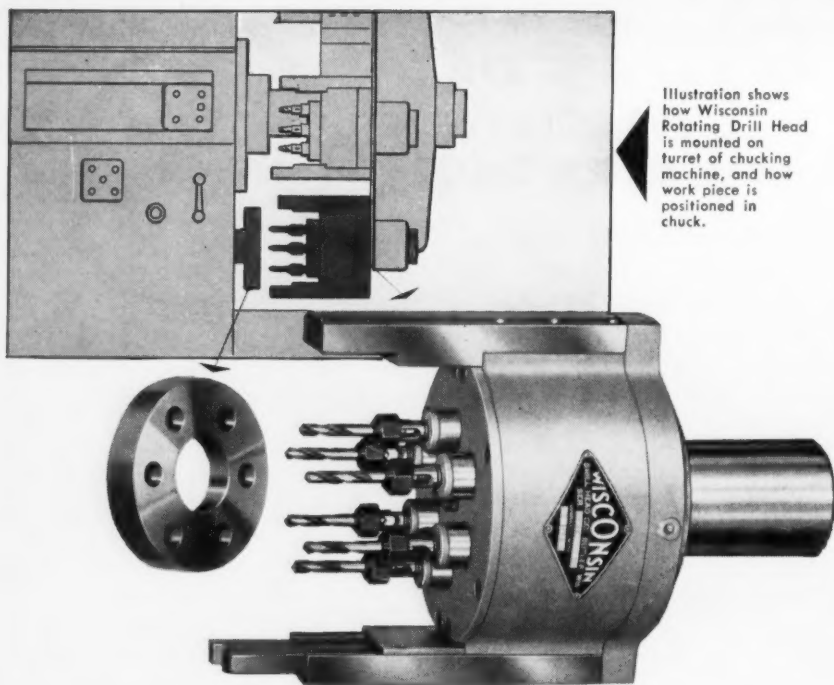


Illustration shows how Wisconsin Rotating Drill Head is mounted on turret of chucking machine, and how work piece is positioned in chuck.

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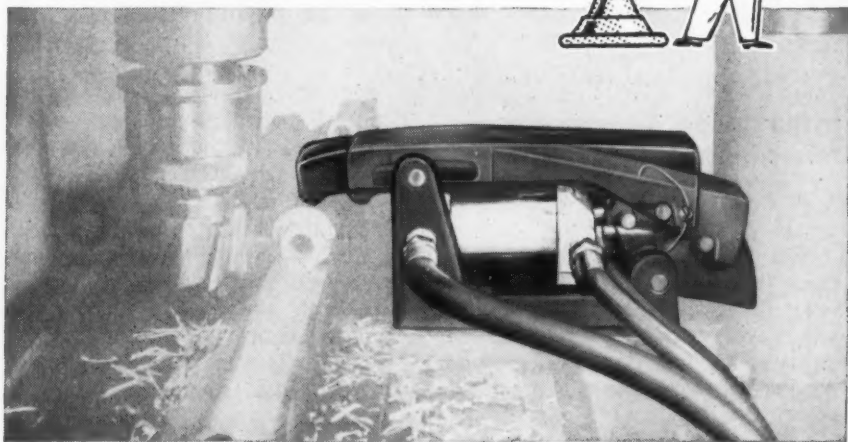
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STILL ANOTHER LODDING FIRST!



Lodding, Inc. announces a completely automatic clamp (patent pending). This new Lodding production meets the need of the metalworking industry for a compact, automatic and heavy-duty clamp. Air operated and cam locked to hold clamp locked in any event of air failure. Note the compactness (the air cylinder is under the clamp). Delivers ten times line pressure. All wearing parts heat treated. Overall dimensions are 3" wide, 3 $\frac{5}{8}$ " high and 8 $\frac{1}{4}$ " long.

LODDING, INC. WORCESTER 1, MASS.

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Los Angeles 47, Calif.
PLeasant 3-1553

Atlanta, Ga. Warehouse
54 11th St., N.E.
TRinity 5-7065

Bagby Engineering Co.
1047 Forest Ave.
Evanston, Ill.
AMbassador 2-2273

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December, 1958

modern machine shop 113

ideas from readers

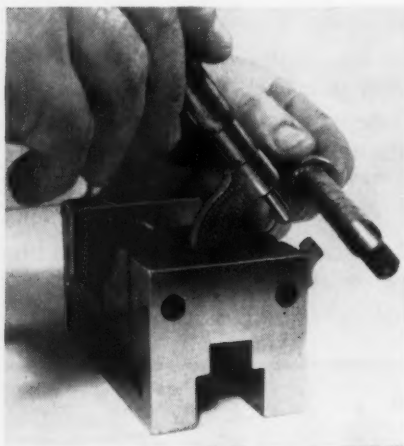
Several time-saving ideas and suggestions for the man in the machine shop.

Improved Bench Micrometer

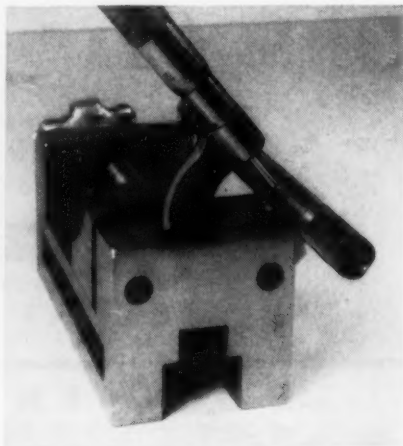
By H. J. GERBER

On many small lot production jobs, for which we do not have fixed gages, we often improvise a very satisfactory bench micrometer by the illustrated method. An ordinary outside micrometer is

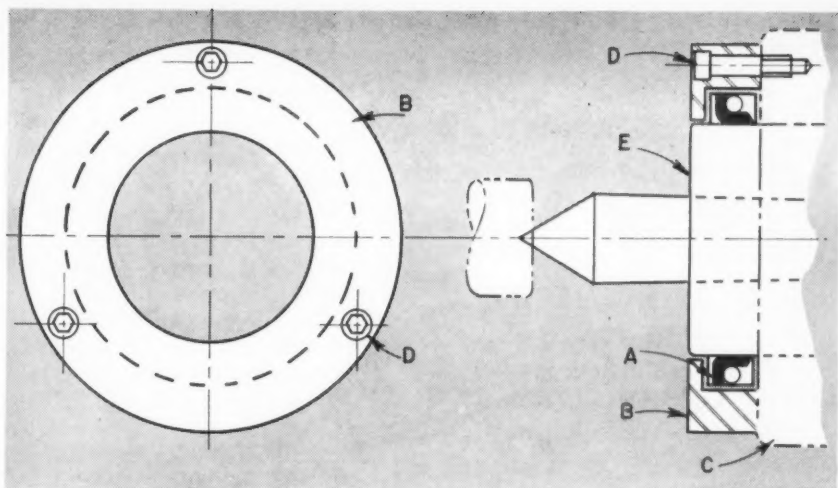
clamped between the jaws of a small precision toolmaker's vise in a manner which permits the edge corner of the vise to be used as a back stop for the work. It will be noted that the micrometer is placed in the vise jaws at an angle in order that work placed between the micrometer contacts will rest on the vise edge. The placement of the micrometer will depend upon the



An ordinary outside micrometer clamped in small vise makes an effective bench micrometer for repetitive inspection operations.



Micrometer has been positioned in vise so that edge corner of vise acts as work rest for proper positioning of the workpiece.



Sketch showing effective method for protecting lathe spindle from foreign matter.

diameter of the work being inspected. Usually this position can quickly and easily be determined by trial when the first piece is set up for checking.

This simple improvisation speeds up repetitive inspection, at no cost for special gages. In cases where it is necessary to check ovality as well as size, the setup will enable the inspector to easily make measurements with one hand while rotating the workpiece against the back stop with the other hand.

★ modern machine shop ★

Oil Seal Protects Lathe Spindle

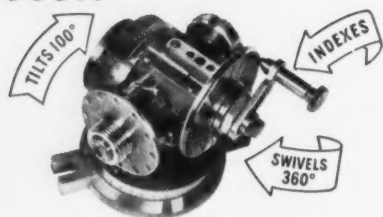
By ROGER ISETTS

It is often necessary to grind shafts between centers on a lathe using a tool post grinder. Since a

considerable amount of highly abrasive dust is created in performing such grinding operations, the sliding tailstock containing the lathe center should be protected. If the abrasive dust falls on the spindle, it could work its way inside the tailstock when the spindle is moved in and out and cause serious damage.

A simple yet effective method of overcoming this problem is shown in the accompanying sketch where in a standard oil seal, A, is used. A ring, B, is bored out to accommodate the seal and is then bolted directly to the spindle housing, C, by means of three socket head cap screws, D. Since the ring in no way interferes with the regular operation of the lathe, it can be left on the tailstock spindle, E, of the lathe all the time to serve as a positive safeguard against the entrance of any other forms of foreign matter.

ELLIS



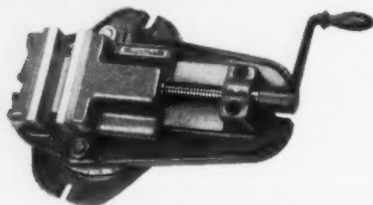
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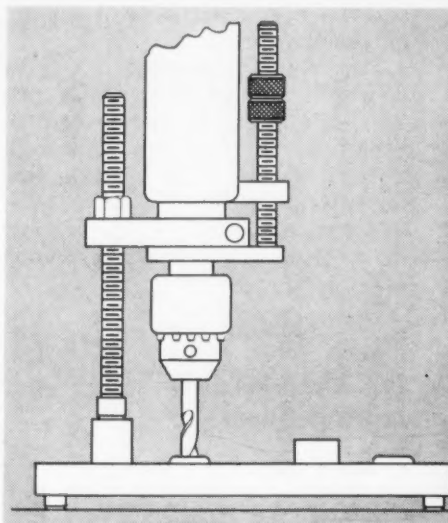
ideas from readers . . .

Multiple Depth Drill Stop

By CLINT McLAUGHLIN

It is frequently necessary to drill a number of blind holes of different depths in the same workpiece. This can be easily and accurately accomplished by attaching a threaded stop to the drill press spindle as shown herewith.

A stop of appropriate height is secured to the top of the jig adjacent to each drill bushing. The height of the stop is determined by the depth of the hole to be drilled; the shallower the hole the taller the stop. The regular depth stop can be used for the deepest hole. The added stop, being threaded, is adjustable to allow for varying setups.



Sketch showing threaded stop attached to drill press for multiple depth control.

December, 1958



Illustrated—Logan Model 400 RFL Unit

Look to Logan

the ultimate in air circuit accessories

Logan RFL Unit, the designers choice for over a decade! Protects your air-powered equipment . . . regulates pressure . . . filters air . . . lubricates air. Adds years of dependable performance.

New Model 400, illustrated above, is a companion model to the well-known Model 600.



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December, 1958

modern machine shop 117

free literature

**Use Postpaid Cards opposite page 32
and inside back cover for requesting
free copies of literature listed below.**

Air Clamp Type Cylinder

The Sheffer Corp., 326 West Wyoming Ave., Cincinnati 15, Ohio. This color bulletin (No. 458) gives information on a compact 1½ inch clamp type universal, clevis or pivot mount air cylinder, which is said to be suitable for tooling, jigs and automation.

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Bed Type Milling Machine

The Producto Machine Co., 990 Housatonic Ave., Bridgeport 1, Conn. Illustrated four page bulletin describes the No. 1 bed type milling machine, sturdily constructed for accurate, rapid milling of light and medium production work.

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Marking Problems

The Acromark Co., 9 Morrell St., Elizabeth 4, N. J. Reprint entitled "Graduating Operations" is a 12 page pamphlet with 34 illustrations of machines and equipment for applying calibrations and graduations economically and simply to scale beams, bars, rules, rings, rolls, strip and dials by use of various standard marking machines.

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Universal Angle Vise

Wesson Co., 1220 Woodward Heights Boulevard, Ferndale 20, Mich. Illustrated Brochure No. AV-158 covers the Model 1A Precision Universal Angle Vise. Also covered in this brochure are idea stimulating illustrations of production and job shop applications for the universal vise line, helpful in planning lower cost, compound angle precision setups for milling, drilling, planing, shaping, grinding, boring and sawing.

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Spot Welders

Sciaky Brothers, Inc., Chicago, Ill. Spot welders are covered in this six page folder. It includes illustrations and specifications of air operated rocker arm units. The welders feature single phase resistance welding.

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Taps and Gages

Beloit Tool Corp., Regal Division, Beloit, Wis. This manual features simplified and direct pricing of special taps and special gages.

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Miniature Drills

Super Tool Co., 21650 Hoover Road, Detroit 13, Mich. Eight page catalog (SB-302) on solid cemented carbide miniature drills, reamers and end mills in sizes as small as 0.024 inch diameter, which have been designed to meet numerous aircraft and missile production requirements. The catalog also covers the company's standard offerings on the aforementioned tools, detailing diameters, lengths, applications and prices. Tools listed are for non-ferrous metals, plastics and non-metallic materials. A separate listing is included on hard steel drills for drilling hardened steels.

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Gages and Inspection Devices

Engis Equipment Co., 431 South Dearborn St., Chicago 5, Ill. Twelve page catalog presents in a ready reference format photographs and digest descriptions of the modern tools, gages and inspection devices required in this era of electronics, nucleonics, missiles and rockets, miniaturization and automation.

For more data circle 13 on Postpaid Card

Hydraulic Turret Drill

Burg Tool Manufacturing Co., Inc., Department 1, 15001 South Figueroa St., Gardena, Calif. This 12 page bulletin illustrates and describes six and eight spindle automatic hydraulic turret drills and the Burgmaster six and eight spindle automatic tape controlled turret drills and machine accessories.

For more data circle 14 on Postpaid Card

Drilling and Tapping Machines

Baker Brothers, Inc., 1000 Post St., Toledo, Ohio. Two catalogs, which provide data on the company's new line of horizontal and vertical hydraulic drilling and tapping machines, are now available.

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Screw Pumps

Sier-Bath Gear and Pump Co., Inc., 9252 Hudson Boulevard, North Bergen, N. J. Six page Bulletin SI-6 outlines construction, operating characteristics, dimensions and capacities of Sier-Bath Internal Gear and Bearing Screw Pumps. The line includes standard horizontal, vertical submerged sump type, vertical dry type hopper and steam jacketed types, in capacities from 1 to 2,000 gallons per minute.

For more data circle 16 on Postpaid Card

Pallet Handling

The Raymond Corp., 88-170 Madison St., Greene, N. Y. This 24 page handbook entitled "Pallet Handling in Narrow Aisles" describes the prin-

ciple types of trucks available for narrow aisle operations and, furthermore, it shows on the job pictures of the equipment in use.

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Alloy Form Dies

Dreis and Krump Manufacturing Co., 7418 South Loomis Boulevard, Chicago 36, Ill. This flyer provides information on induction hardened, superfine finish, alloy form dies for all makes of press brakes.

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BALL SEAT REAMERS

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Conductor Systems

The Cleveland Crane and Engineering Co., 6469 East 281st St., Wickliffe, Ohio. Aluminum Inverted-Y Conductor Systems are described in Electrification Booklet No. 1. This covers crane and runaway electrification for general industrial usage, requiring currents of 500 to 1,200 amperes. The equipment includes fittings and current collectors for conductor systems mounted on either wall or ceiling.

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Automatic Turret Lathes

Jones and Lamson Machine Co., Department 710, 521 Clinton St., Springfield, Vt. Catalog No. LO-5808 presents complete information on ram type automatic turret lathes with Lynn hydraulic drives.

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Coil Splicing Equipment

E. W. Bliss Co., Rolling Mill Division, 1375 Raff Road, Southwest, Canton 10, Ohio. Bulletin 43-A is an illustrated

four page bulletin which describes the company's line of Splice-A-Matic Welding Equipment. Typical arrangements of coil build-up lines are shown, as well as diagrams explaining the principle of Splice-A-Matic welding.

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Power Tools

Rockwell Manufacturing Co., Delta Power Tool Division, 497 North Lexington Ave., Pittsburgh 8, Pa. Newly revised 88 page catalog describes a complete line of industrial power tools and accessories. Some of the tools described are drill presses, grinders, shapers, planers, jointers, metal and wood cutting lathes, tilting arbor saws, unisaws, band saws and radial saws.

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Parts Feeding

Automation Devices, Inc., Erie, Pa. This 23 page color catalog contains complete

engineering feeder knowledge for developing specific parts feeding.
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Lubricants, Greases and Oils

Sun Oil Co., Industrial Products Department, Department MM-9, Philadelphia 3, Pa. Booklet gives information on the complete line of industrial products — general and specialty lubricants, greases, mine lubricants, diesel lubricating oils, cutting, quenching and other metalworking oils, hydraulic oils, heat transfer oils, rubber process aids, waxes, petrochemicals, spray oils, solvents, refrigeration oils, electrical oils and textile machine oils.

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Die Steel

Allegheny Ludlum Steel Corp., Department MS-10, Oliver Building, Pittsburgh, Pa. Four page blue sheet on "Saga-more-EZ Free Machining Air Hardening Die Steel," describes the steel as applicable to blanking and forming punches, dies and rolls; trimmer dies, cold or hot; plastic molding dies; straightening and bending dies; and various types of gauges.

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Assembly Machine

Dixon Automatic Tool, Inc., 2314 Twenty - Third Ave., Rockford, Ill. A four-page bulletin (No. AP-B2) on the improved Dixon Auto-Positioner for the placing and assembly of small piece parts.

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Lamination Dies

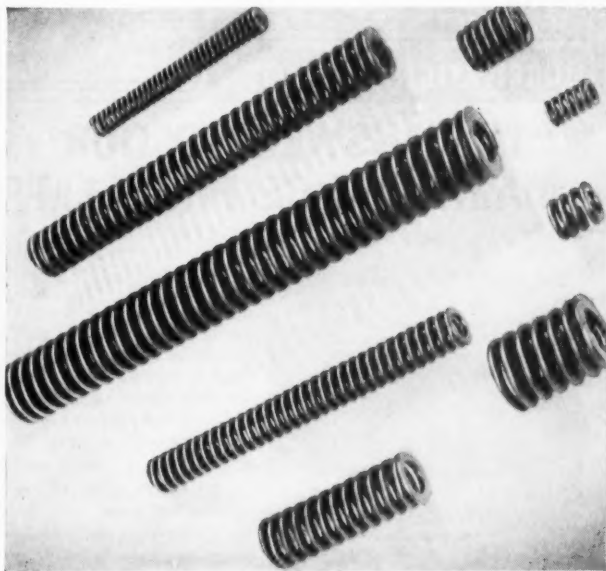
Kennametal, Inc., Latrobe, Pa. Report No. 568 shows the performance of its K92 grade carbide composition.

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Depressed Center Wheels

Simonds Abrasive Co., Tacony and Fraley Sts., Philadelphia 37, Pa. This four page color bulletin describes and illustrates depressed center wheels for weld grinding and general use.

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Die Springs

Chrome vanadium die springs in stock in a wide variety of hole and rod sizes, lengths and deflections. Medium, medium-heavy, heavy duty for increased life and reduced down time. Write for list of specifications and prices, and name of nearest distributor.



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Vertical Milling Machine

Index Machine Co., 544 North Mechanic St., Jackson, Mich. Pamphlets describe the Model 45 Vertical Milling Machine, which is a sliding overarm turret type mill, and the Model 55 improved vertical miller.

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Submerged Arc Tandem Welding

Lincoln Electric Co., Department 3522, Cleveland, Ohio. This four page bulletin

(5200.2) claims that substantially increased welding speeds and improved control of bead shape are the principal advantages of multiple electrode submerged arc tandem welding over single arc operation.

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Cutting-Off Machines

Modern Machine Tool Co., 2005 Losey Ave., Jackson, Mich. Brochure provides detailed information of Modern Cutting-

Off Machines and automatic loaders, hot spinning machines and safety drill tables.

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Slide Feed

U. S. Tool Co., Inc., Ampere (East Orange), N. J. Bulletin No. 151 illustrates and describes the U. S. Slide Feed, which has been completely redesigned. Features such as accuracy, durability and versatility have been retained. The new models are much simpler to set up and adjust, resulting in a considerable time saving when changing over from one job to another.

For more data circle 32 on Postpaid Card

Power Presses

Johnson Machine and Press Corp., 620 West Indiana Ave., Elkhart, Ind. Bulletin 1958A gives complete specifications of this company's line of power presses, which includes 40 models.

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Grinding and Lapping Machines

Norton Co., Worcester 6, Mass. Revised catalog on precision grinding and lapping machines. Details are included on the Type S-3 6 by 18 inch hydraulic surface grinder, the No. 2 unitized transfer type crankpin grinder and the Type CC-8 Crank-O-Matic Semi-automatic Crankpin Grinder.

For more data circle 34 on Postpaid Card

Tubular Products, Fittings and Flanges

The Babcock and Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Four page folder (TDC-186) is a ready cross reference between the type of steel, the application and the specifications covering the product (various types of carbon, alloy and stainless steel tubing, pipe, seamless welding fittings and flanges).

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Holding Devices

Heinrich Tools, Inc., Racine, Wis. This 28 page catalog provides complete descriptions and tool application problems and solutions of a full line of screwless, fast production vises and automatic self-centering air vises.

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Steel Bars

La Salle Steel Co., Post Office Box 6800-A, Chicago 80, Ill. An 11 by 17 inch wall chart lists all AISI grades of cold finished steel bars. This five page comparison chart lists 241 grades of steel bars.

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Brushes

Osborn Manufacturing Co., Department B-18, Cleveland 14, Ohio. Eight page two color booklet tells the TY Brush story. It shows the various designs and applications of this brush.

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Lathe Centers

Nielsen, Inc., Lawton, Mich. Catalog presents data on live centers and tailstock spindles.

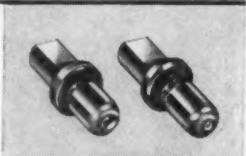
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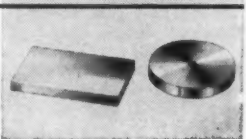
CLARK Diamond Cone Penetrators are exactly right for your "Rockwell" hardness tester, whether or not it bears the CLARK name. Every step in their manufacture, from careful diamond selection to expert lapping, leads to a precision product that will give you precision results. Yet CLARK Diamond Penetrators cost surprisingly little.



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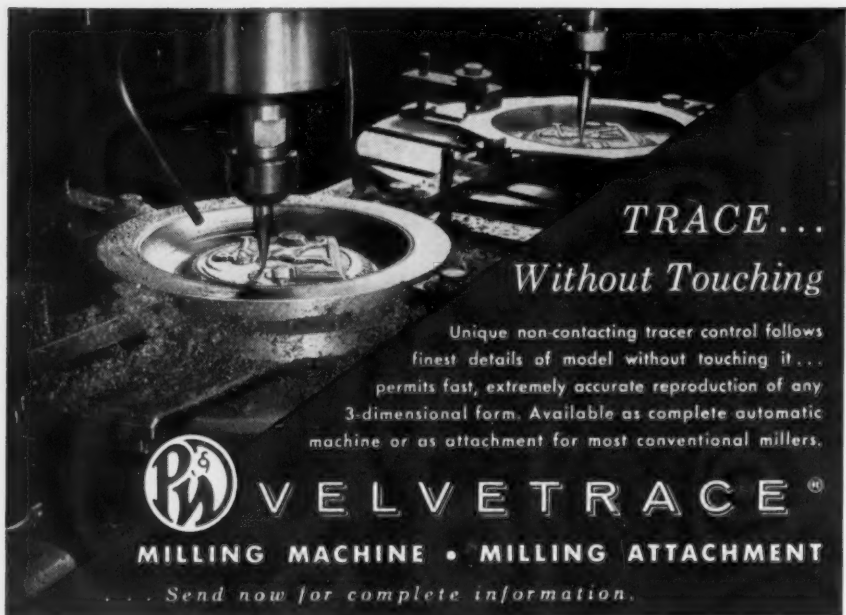


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Discs

Karl A. Neise, Department MM-118, 404 Fourth Ave., New York 16, N. Y. Data sheets provide detailed information on Ringspann Discs for precision clamping and chucking of workpieces with cylindrical clamping surfaces.

For more data circle 40 on Postpaid Card

Chucks

Supreme Products Corp., 2222 South Calumet, Chicago 16, Ill. Color Bulletin 333 gives information on geared key chucks, keyless chucks, tap and impact chucks, chuck arbors and keys and power tool attachments.

For more data circle 41 on Postpaid Card

Counterbores

Arcanum Tool Co., Arcanum, Ohio. This bulletin gives complete information on Shearproof Eccentric Counterbores, Type "ET" Toolholders, standard counterbores, standard pilots and miscellaneous special and multi-diameter cutters.

For more data circle 42 on Postpaid Card

Punch Press

Kenco Manufacturing Co., 5211 Telegraph Rd., Los Angeles 22, Calif. Two bulletins cover the Kenco 15 Ton Punch Press and the 15 Ton Electro-Safe Punch Press.

For more data circle 43 on Postpaid Card

Ground Flat Stock

Marshall Steel Co., Box 108-M, La Grange, Ill. Catalog presents information of the company's three kinds of precision ground flat stock—OILcrat, AIRcrat and MarshallLcrat.

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Bacterial Inhibitor

Eli Lilly and Co., Agricultural and Industrial Products Division, Indianapolis 6, Ind. This folder tells how to keep cutting fluids fresh as a daisy by the use of Elcide 75, which is a bacterial inhibitor that extends effective life of soluble oil emulsions, eliminates odor and spoilage due to bacterial contamination.

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Boring Bars and Cutters

Vee Bee Manufacturing Co., Muskegon, Mich. Catalog presents information on boring bars and cutters and gives specifications of each.

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Gate and Enclosure Guard

Searjeant Metal Products, Inc., No. 52 Pittsford Road, Mendon, N. Y. Literature fully describes a universal gate and enclosure guard for power presses. The uses and operation of this product are also described.

For more data circle 47 on Postpaid Card

Vises, Tables and Milling Attachments

Chicago Tool and Engineering Co., 8399 South Chicago Ave., Chicago 17, Ill. This eight page catalog gives information on angle, drill press, machine, utility, adjustable angle, aluminum hand, swivel machine and various other vises. It also includes data on cross slide milling tables, rotary and indexing tables and milling attachments for use on engine lathes.

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Plate Bending Rolls

Niagara Machine and Tool Works, Buffalo 11, N. Y. Illustrated Bulletin 77E Supplement presents 9 and 10 inch diameter plate bending rolls with fingertip control. Descriptions of the welded steel construction, heavy duty squirrel cage brake type motor, silent worm gear drive, pinch type rolls and power driven back roll are included, in addition to specifications.

For more data circle 49 on Postpaid Card

Rotary Surface Grinder

The Heald Machine Co., Worcester 6, Mass. An eight page, illustrated, two color bulletin describes the Heald Model 161 Rotary Surface Grinding Machine for precision grinding of flat, concave and convex surfaces of small work. It is designated as Bulletin 2-161-1.

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Drill Press

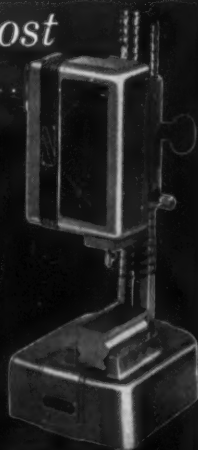
Zagar, Inc., 23898 Lakeland Boulevard, Cleveland 23, Ohio. Bulletin 858 contains information on the Models QAR, QEN QPL Air-Oil Feed Drill Presses.

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Barrel Finishing

The Carborundum Co., Electro Minerals Division, Niagara Falls, N. Y. "Tumbling Media for Barrel Finishing" is an informative 20 page, four color booklet, based on the latest laboratory and factory case studies. It has been designed as a practical handbook for supervisors and operators.

For more data circle 52 on Postpaid Card

Metal Cutting Band Saw

Cutron Manufacturing Co., 303 North Avenue U, Lubbock, Texas. This bulletin describes and illustrates the Cutron Model "E" Metal Cutting Band Saw. Numerous features of this machine and, also, specifications are included.

For more data circle 53 on Postpaid Card

Metal Cutting Shears

Beverly Shear Manufacturing Co., 3000 West 111th St., Chicago 43, Ill. This leaflet tells about the company's metal

cutting shears, designed for every purpose. Information is included on the Beverly Throatless Shear, pneumatic shear, electric throatless nibbling shear, the Beverly Inside Slotter and the SS Series Slitting Shears.

For more data circle 54 on Postpaid Card

Vibrating Feeders

Syntron Co., 309 Lexington Ave., Homer City, Pa. Data and specifications on heavy and extra heavy duty electromagnetic vibrating feeders with electrically heated trough liner plates, which facilitate the efficient feeding of high moisture content bulk materials.

For more data circle 55 on Postpaid Card

C Frame Presses

The Hydraulic Press Manufacturing Co., Division of Koehring Co., Mount Gilead, Ohio. Eight page catalog illustrates and describes the function and operating characteristics of two manually control-

led c frame presses. Bulletin 58CPM covers dimensional, as well as application data, accessories and operating controls. Bulletin 58CPA is a 12 page catalog which covers four automatic models of the H-P-M c frame press.
For more data circle 56 on Postpaid Card

Milling Machine and Boring Mill

Sundstrand Machine Tool Co., 2539 Eleventh St., Rockford, Ill. This color brochure describes in detail the Sundstrand Omnimil for machining at any and all angles. Made in two sizes, the Omnimil offers the rigidity of a heavy duty milling machine, the versatility of an all angle head and the capacity of a boring mill.

For more data circle 57 on Postpaid Card

Filters

The Cuno Engineering Corp., Department 53, South Vine St., Meriden, Conn. Catalog No. 53-101 presents depth type fiber cartridge filters for use in the full flow filtration of practically all types of fluids.

For more data circle 58 on Postpaid Card

Relapping Facilities

Herman Stone Co., 1860 North Gettysburg Ave., Dayton 27, Ohio. Bulletin 101 describes and illustrates relapping facilities for granite surface plates. In addition, it gives detailed information on surface plate care and maintenance procedures, including periodic inspection programs, to insure maximum tolerance accuracy.

For more data circle 59 on Postpaid Card

Thread Plug Gages

Threadwell Tap and Die Co., Greenfield, Mass. Flyer describes and illustrates the Black Diamond Thread Plug Gages, which feature unusual hardness and long wear life, due to a newly developed surface treatment.

For more data circle 60 on Postpaid Card

Diamond Tools

Koebel Diamond Tool Co., 9456 Grinnell, Detroit 13, Mich. "Diamond Pioneering for More than a Quarter Century" gives background information on diamonds, in addition to data on this company's line of diamond tools.

For more data circle 61 on Postpaid Card

For HIGH-SPEED FINISHING

... New KELLERFLEX AIR TOOLS

handle higher speeds under load, save time, insure finer work for burring, grinding and other intricate finishing operations on dies and similar work. Lightweight, compact, vibration-free, easy to use with one hand. Three models provide 20,000, 40,000 and 60,000 rpm. Collets $\frac{1}{8}$ " and $\frac{1}{4}$ ". Perfect supplement to our popular line of Kellerflex Flexible Shaft Machines.



PRATT & WHITNEY

FIRST CHOICE FOR ACCURACY

MACHINE TOOLS • GAGES • CUTTING TOOLS

Write for Circular No. 616.
PRATT & WHITNEY Co., Inc.
25 Charter Oak Blvd.,
West Hartford, Conn.

For more data circle 393 on Postpaid Card

December, 1958

modern machine shop 127

free literature . . . (For free literature use postpaid card opposite inside back cover)

Box Table

Lagoe Oswego Corp., 50 East 12th St., Oswego, N. Y. This flyer describes and illustrates a box table for radial drills, boring mills and other floor type machine tools.

For more data circle 62 on Postpaid Card

Ovens and Furnaces

L and L Manufacturing Co., 299 Eighth St., Upland 71, Delaware County, Pa. Sheet describes briefly the various heating, treating, processing, production and

laboratory furnaces and two series of forced convection ovens for laboratory and production use.

For more data circle 63 on Postpaid Card

Cylinders

Flick-Reedy Corp., Miller Fluid Power Division, 2024 North Hawthorne, Melrose Park, Ill. Catalog sheet contains drawings which compare the mounting space required for various bore square type four tie rod design cylinders with similar bore sizes of the common threaded or keeper ring type cylinders.

For more data circle 64 on Postpaid Card



FOUR POSITION DRILLING & TAPPING TURRET HEAD

FITS ALMOST ANY
DRILL PRESS

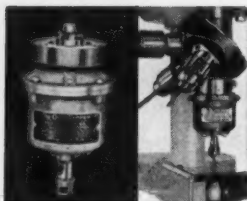
No need to set up for each operation. A simple rotation of this turret head brings any of four drills or cutting tools into position. Speeds production—cuts cost! Specify size and make of drill press when ordering QUADRILL.

For Fast Accurate Tapping Operations use the **quadtapper**

You get precision tapping at high speed by simply attaching the QUADTAPPER to any of the four spindles of the QUADRILL. Write today for complete information on both these production tools.

CHICAGO QUADRILL
Company

1854 BUSSE HIGHWAY • DES PLAINES, ILL.



FOR USE ON QUADRILL ONLY

For more data circle 394 on Postpaid Card

Horizontal Presses

Dake Corp., 612 Robbins Road, Grand Haven, Mich. Catalog No. 410 features the Dake line of horizontal presses. They are described in detail and the different types shown have been designed to meet the production requirements of the shop that must handle extra long or extra heavy work.

For more data circle 65 on Postpaid Card

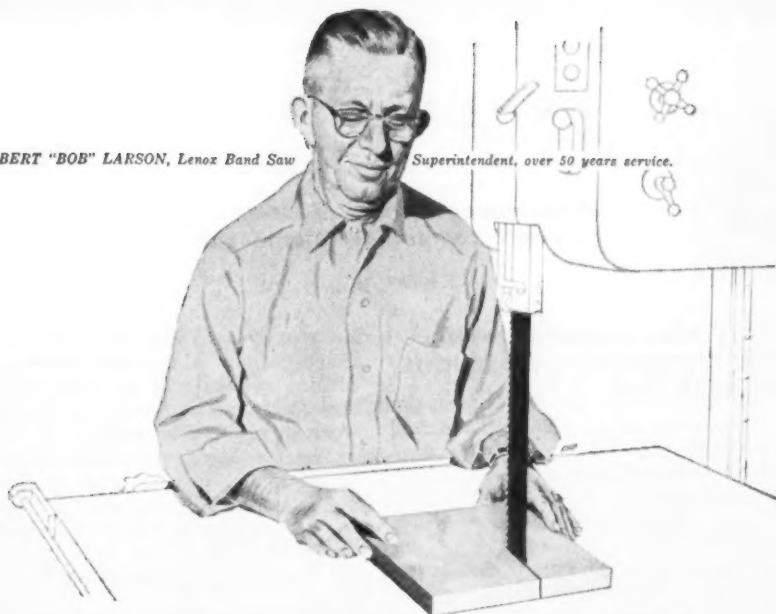
Surface Grinder

Boyar - Schultz Corp., 2020 South 25th Ave., Department C-CH, Broadview, Ill. This six page bulletin completely describes and illustrates the Challenger 6-18 Surface Grinder. It gives information on accessories for the Challenger and, also, on other types of grinding machines made by this company.

For more data circle 66 on Postpaid Card

ROBERT "BOB" LARSON, Lenox Band Saw

Superintendent, over 50 years service.



PRECISION SAWING WITH THE INCOMPARABLE **LENOX BAND SAW BLADES**

Incomparable, yes. Advanced heat treating . . . machining . . . and setting methods (developed by LENOX engineers) . . . these are the basic reason for the outstanding cutting qualities of LENOX band saw blades.

Flame-hardened teeth retain their sharp edges, even when cutting extra-tough material. LENOX bands can be used on all types of machines for contour sawing and cut-off work.



Available in welded bands and 100 ft. coils.



AMERICAN SAW & MFG. COMPANY
SPRINGFIELD, MASSACHUSETTS • U.S.A.

For more data circle 395 on Postpaid Card

December, 1958

modern machine shop 129

news of the industry

**Appointments . . . officers . . . obituaries
. . . new companies, plants and expansions**

Edited by L. L. BALDHOFF

PRATT AND WHITNEY OPENS NEW DISTRIBUTION WAREHOUSE IN CLEVELAND

Completion of a new precision tool warehouse and the inauguration of a new distribution operation was recently announced by Pratt and Whitney Co., Inc., West Hartford, Conn., manufacturer of machine tools, cutting tools and gages. A 4,000 square foot building was constructed adjoining the company's Sterling Die Division plant in Cleveland, Ohio, to house the new modern stockroom facilities.

Herbert Yankee, Pratt and Whitney vice president and manager of Sterling Die, will be in charge of the Cleveland warehouse operation. Under this new arrangement, Cleveland will stock standard cutting tools and conventional gages to fill the requirements of all P. and W. local stores and distributors outside of New England,

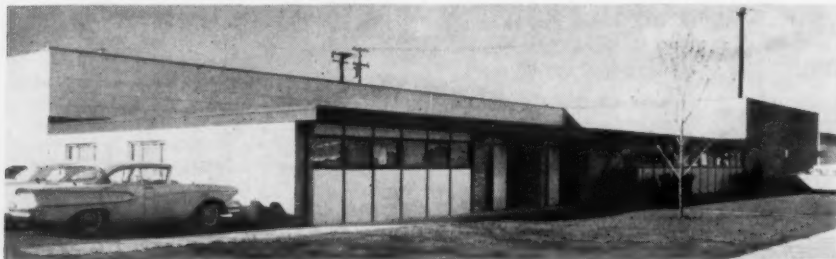
Eastern New York, New Jersey and Pennsylvania. A new combined order-invoice system will go into effect at the same time, streamlining the paper work in processing orders.

The Cleveland warehouse operation was established as a part of the expansion program designed to provide the best service and fastest delivery to customers. Plans are well underway for a similar installation on the West Coast.

★ modern machine shop ★

SUNDSTRAND ACQUIRES PACKMASTER MACHINE LINE

Acquisition of all design, manufacturing and sales rights to the line of Packmaster automatic packaging machinery has been announced by Sundstrand Machine Tool Co., Rockford,



Pratt and Whitney's new warehouse facility, which is located in Cleveland, Ohio

Illinois. Machines in the new Sundstrand-Packmaster line are capable of flat or dome type enclosures for hardware, strip trim, spare parts and similar items.

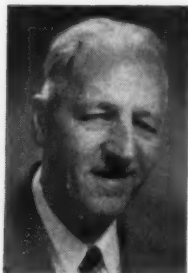
Either single or multiple items can be packaged by machines in the line, with hopper feed available for all models where required. Auxiliary functions, such as counting and printing, are performed by optional accessory equipment.

Sundstrand-Packmaster machines will be built and sold through Sundstrand's American Broach Division, Ann Arbor, Mich.

★ m m s ★

B. C. AMES NAMES PRESIDENT

Henry G. Haynes has been named president of B. C. Ames Co., Waltham, Mass., to succeed the late Warren Ames. This manufacturing firm pro-



Henry G. Haynes

December, 1958

duces a line of dial indicators, dial gages, air and electric gages. Mr. Haynes has long been associated with the B. C. Ames Company and has been treasurer for more than twelve years. At the same time that Mr. Haynes was named president, the board of directors elected Bliss C. Ames as vice president, Warren Ames, Jr. as vice president and Henry G. Haynes, Jr. was elected treasurer.

PALMGREN

**GET THIS
FREE
CATALOG on
Work Holding
Tools now!**



Used in all industries . . . everywhere

This catalog shows the most complete line of work holding tools available anywhere for production on milling machines and drill presses . . . angle vises . . . drill press vises . . . swivel machine vises . . . adjustable angle plates with or without swivel bases . . . production vises . . . heavy duty angle vises . . . rotary and indexing tables for use on milling machines and drill presses . . . milling attachments for milling on lathes.

There are 68 different models and types of Palmgren vises, rotary tables, milling attachments and other machine tool accessories, with jaw sizes from 1½" to 8". Ask for your copy of this FREE Catalog No. 205 today, showing the complete line, details and prices.

125

CHICAGO TOOL and ENGINEERING CO.

8399 SOUTH CHICAGO AVE. • CHICAGO 17, ILLINOIS

For more data circle 396 on Postpaid Card

modern machine shop 131

RUSSELL M. FELLOWS

Announcement was recently made by The Fellows Gear Shaper Co., Springfield, Vt., of the death of Russell M. Fellows, chairman of the board of directors and treasurer. Mr. Fellows died at his home at the age

of 66. In 1945, Mr. Fellows was elected a vice president of The Fellows Gear Shaper Company. He became chairman of the board earlier this year.

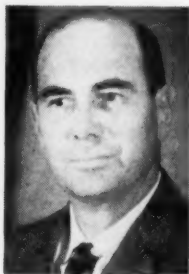
★ modern machine shop ★

A.M.T.D.A. ELECTS OFFICERS

The American Machine Tool Distributors Association has announced the election of J. O. Ellison, president of Harron, Rickard and McCone Company of Northern California, San Francisco, California, as president at its Thirty - Fourth Annual Meeting



DAD? You said you were coming home early. All the other kids' fathers are home. Why don't you use Threadwell cutting tools like they do? That's what Mommy told me to say. Grandpa is a Threadwell Distributor, you know. *Photo by Cobb Shinn for Threadwell Tap & Die Co., Greenfield, Mass.*



J. O. Ellison



J. Russell Clark

For more data circle 397 on Postpaid Card

which was held recently in Boston, Massachusetts.

Among the other officers elected to new positions at the meeting were: J. Russell Clark, who became first vice president; George E. Merryweather, second vice president; and I. B. Rabel, secretary-treasurer. Mr. Clark is president of White Star Machinery and Supply Co., Inc., Wichita, Kansas. Mr. Merryweather is vice president and secretary of Motch and Merryweather Machinery Co., Cleveland, Ohio. Mr. Rabel is president of Star Machinery Co., located in Seattle, Washington.



G. E. Merryweather



I. B. Rabel

BRYANT GAGES AND SURFACE PLATES MOVE TO OHIO

Headquarters for Bryant Gages and Surface Plates recently moved from Springfield, Vermont to the Ex-Cell-O Plant in Greenville, Ohio. The Bryant line includes thread and groove gages for production checking and long wearing true granite surface plates made to precision standards and stocked in various sizes. This move was announc-



BOSS . . . you haven't walked me around the block for weeks, and you know what weak kidneys I have. Why don't you see your Threadwell Distributor for high performance cutting tools. You'll get home from the shop a lot quicker, and I won't have to lead such a man's life. *Photo by Cobb Shinn for Threadwell Tap & Die Co., Greenfield, Mass.*

For more data circle 398 on Postpaid Card

ed by Ex-Cell-O Corp., Detroit, Mich., which acquired the Bryant Chucking Grinder Company earlier this year through an exchange of stock.

There is to be no change in the Bryant sales staff or dealer organization for this line of products. Russell Scholl, who remains in charge of sales

of this Bryant line, has moved to the Greenville area.

★ modern machine shop ★

W. J. STEWART ELECTED PRESIDENT OF CLEVELAND PUNCH AND SHEAR WORKS

William J. Stewart has been elected president of The Cleveland Punch and

Shear Works Co., Cleveland, Ohio manufacturers of mechanical power presses, metal fabricating tools and punching tools and dies.

During his forty years of service at Cleveland Punch and Shear Works, Mr. Stewart has been active in the growth of the metalworking industry. For the past eighteen months, Mr. Stewart has been vice president and general manager of the company.



William J. Stewart

B&W SAMPLER

Brings Typical Spot & Center Drills
and Adapters for you to shop-test
without obligation

Ask
for
it



You can't fully appreciate the convenience, low cost and time saving advantages of these tools until you try them. That's why we're making it easy for you to do so — at your convenience. Return the sampler after your evaluation — using label and postage enclosed. Any tools you may wish to retain will be billed later.

B & W PRECISION PRODUCTS CO.

11393 E. Eight Mile Road, P. O. Box 3865
Detroit 5, Michigan, Engineering Dept. M.

For more data circle 399 on Postpaid Card

... now your distributor can supply **both**

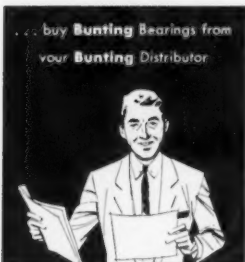
Bunting®

**CAST OR
SINTERED BRONZE**

Fast pick-up...

Stock sizes of Bunting Cast Bronze and Sintered Bronze Bearings and Bars are available everywhere in America. Every one is a precision product of scientifically exact manufacturing methods, meeting on every point the highest standards of quality as defined by modern mechanical engineering and metallurgy.

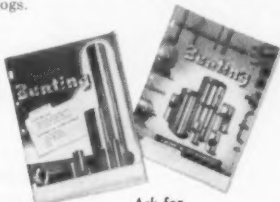
FIRST AWARD
For Advertising Excellence
Distributors Associations
1952 1956 1958



... buy **Bunting Bearings** from
your **Bunting Distributor**



Your Bunting distributor is listed in the classified section of your telephone directory usually under Bars—Bronze, and Bearings—Bronze. Two Bunting factories and eleven Bunting Branch Warehouses expedite distribution in all areas. Ask your local Bunting distributor or write for catalogs.



Ask for
Catalog No. 58—Cast Bronze and Sintered
Bronze Bearings and Bars
Catalog No. 258—Electric Motor Bearings
and Cast Bronze Bars

Bunting®

**BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS
OF CAST BRONZE AND POWDERED METAL**

THE BUNTING BRASS AND BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES

For more data circle 400 on Postpaid Card

December, 1958

modern machine shop 135

news of the industry . . .

NEW TOOL COMPANY FORMED

Announcement was recently made that a new boring and reaming tool manufacturing firm, Muskegon Tool Industries, Inc., has been formed in Muskegon, Mich., and has started production of tools similar to those formerly produced in Muskegon by Madison Industries, Inc. The firm

expects to fill the gap left in the community's industrial picture when Madison closed its operation in Muskegon last July.

The company's line will initially consist of metalworking boring and reaming tools with adjustable, floating cutters which automatically compensate for errors in tool alignment.

Heading the new firm is Warren E. Gill, formerly president of Madison Industries, Inc. The other officers—

Earl L. Prais, vice president; Mrs. Walter Teichthesen, assistant treasurer; and C. F. Latimer, secretary — are also former Madison executives. The firm expects to employ more than 50 skilled toolmakers, who have previously worked at Madison Industries.

★ m m s ★

H. HARIG RECEIVES APPOINTMENT

Herbert Harig, president of the Harig Manufacturing Corp.,

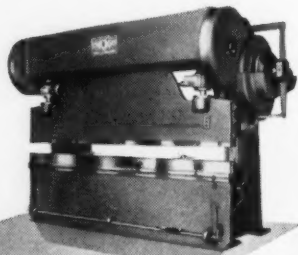


Herbert Harig

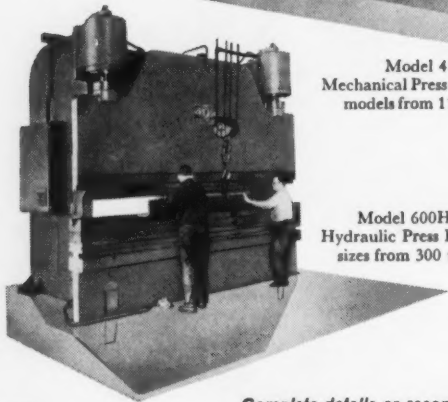
CHICAGO® PRESS BRAKES

UNEXCELLED ACCURACY

for sheet metal
and plate work



Model 410D, 90-Ton CHICAGO Mechanical Press Brake. Other standard models from 11 to 450 ton capacities.



Model 600H10, 600-Ton CHICAGO Hydraulic Press Brake. Other standard sizes from 300 to 2000 ton capacities.

8489

Complete details or recommendations
on any press brake work upon request

Press Brakes
Press Brake Dies
Straight-Side-Type Presses
Hand and Power Bending Brakes
Special Forming Machines



DREIS & KRUMP
MANUFACTURING CO.

7418 S. Loomis Blvd., Chicago 36, Illinois

For more data circle 401 on Postpaid Card

Chicago, Illinois, makers of tools, dies and machine tools, has been selected by the U. S. Department of Commerce as a member of a six man trade mission team to India as a specialist in the tool and die field. The purpose of the mission is to promote better relationships between the people of the United States and India through face to face contacts with businessmen and in meetings with chamber of commerce groups and rotary clubs in fifteen cities. The tour is expected to take four weeks and wind up on December 10th at the U. S. Sole Exhibit in New Delhi. Mr. Harig has already attended orientation meetings in Washington and has taken the many shots required before leaving on this assignment. The foreign branch of the Department of Commerce screens all prospective members very carefully before making any selections to a trade mission such as this.

SPRING LOADED LIVE CENTER



Eliminate excessive overhang of your center. Use the accurate, rugged, reliable "NIROL". The spring loaded Live Center that compensates for expansion and contraction in actual operation.

Write
for complete
information.

*Reg. U.S. Pat. Off.



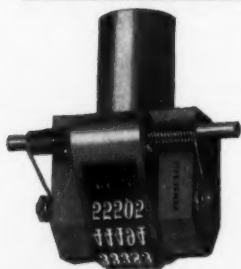
***NIROL** MANUFACTURING
COMPANY

901 H'WAY 22, N. PLAINFIELD, N. J.

For more data circle 403 on Postpaid Card

NUMBERALL

CUTS THE COST OF STAMPING NUMBERS



MODEL 50 Automatic
Numbering Head. Write
for catalog MS-50.

numbering heads, non-automatic, with quick-set wheels. Write for catalogs MS-80, MS-83 and MS-85.

We can also make steel type with round face characters.

The most efficient method of stamping numbers into metal. Repeats the same numbers until changed. Model 70 NUMBERALL machines are used in all industries to mark various parts. Stamps numbers, etc., quickly . . . neatly. Much better marks are produced by these machines than by single stamps or steel type, and at a far lower cost. Shank for Hand or Press and with any number of wheels from 3 to 20. Can be furnished in 1/32" to 3/8" high figures, sharp face gothic or shaded roman style. Write for Bulletin MS-70. We also make other



NUMBERALL STAMP & TOOL CO.

HUGUENOT PARK STATEN ISLAND 12, N. Y.

Hand shank Model 70 illustrated. Press shank for foot or power presses also available.

For more data circle 402 on Postpaid Card



Ralph J. Kraut



Ludlow King



Alan C. Mattison



Walter K. Bailey

N.M.T.B.A. Elects Officers

Ralph J. Kraut, president, Giddings and Lewis Machine Tool Co., Fon du Lac, Wis., was elected president of the National Machine Tool Builders' Association at its 57th Annual Meeting, held November 4-7 at the Homestead, located in Hot Springs, Virginia. Ludlow King was re-elected executive vice president of the association.

Alan C. Mattison, president, Mattison Machine Works, Rockford, Ill., was elected first vice president, and Everett M. Hicks, vice president and general manager, Grinding Machine Division, Norton Co., Worces-

ter, Mass., was elected second vice president.

Graham E. Marx, vice president and general manager, The G. A. Gray Co., Cincinnati, Ohio, was re-elected treasurer. Walter K. Bailey, president, Warner and Swasey Co., Cleveland, Ohio, was re-elected secretary of the association.

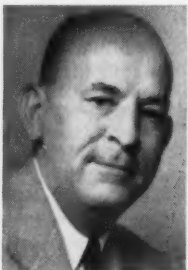
New directors elected were: Everett M. Hicks, James K. Fulks, executive vice president, Ex-Cell-O Corp., Detroit, Mich., and Grayson M. Stickell, president and general manager, Landis Machine Co., Waynesboro, Pennsylvania.



James K. Fulks



Everett M. Hicks

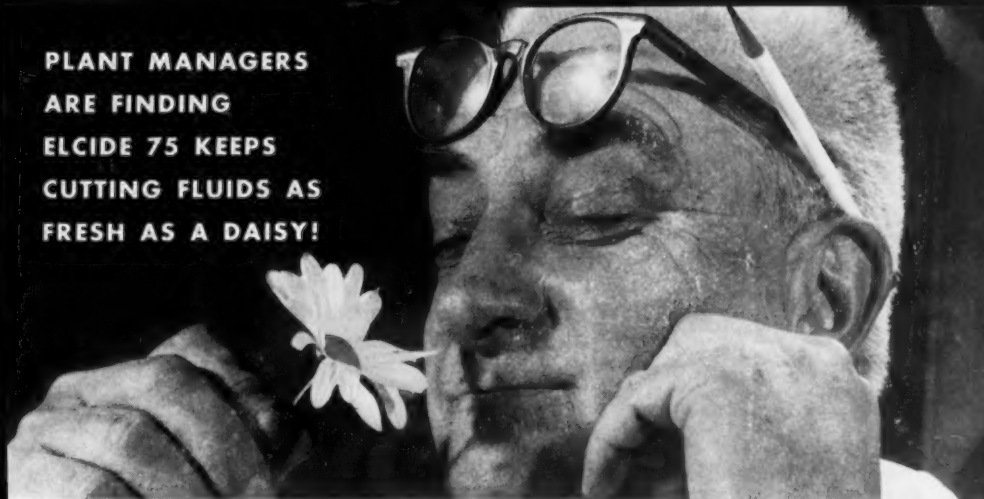


Grayson M. Stickell



Graham E. Marx

**PLANT MANAGERS
ARE FINDING
ELCIDE 75 KEEPS
CUTTING FLUIDS AS
FRESH AS A DAISY!**



ELCIDE 75™ controls bacteria in soluble oil emulsions

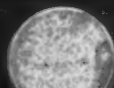
... increases production at lower costs

Elcide 75 is a new bacterial inhibitor that controls a wider range of the harmful bacteria that cause emulsion breakdown, corrosion, and odor. This positive control means it is now possible to extend the life of standard duty emulsions up to 5½ times longer than ever before. This longer emulsion life decreases the down time previously spent for recharging, thereby increasing production and labor efficiency. Total soluble oil requirements are less, and so are waste-oil disposal problems.

Elcide 75 is safe to employees and machinery. Shop tests show it is non-toxic and safe, and it controls the bacteria that may cause acidic corrosion of machinery and staining of products.

Elcide 75 is more effective than commonly used single inhibitors. It is a combination of antibacterial agents, including a powerful new compound related to one of the safest and most effective bacterial inhibitors used in medical surgery.

Bacterial plate counts prove the killing power of Elcide 75. The light areas shown in the photograph are harmful bacterial colonies that have built up in a normal untreated emulsion in 12 weeks. Notice the emulsion treated with Elcide 75 is still clean and clear.



UNTREATED



ELCIDE 75-TREATED

Elcide 75 specifications: Active Ingredients—Sodium Ethylmercuri Thiosalicylate (Thimerosal) and Sodium o-phenylphenate. Price per gallon—1-gallon polyethylene, \$8.50, 5-gallon polyethylene, \$8.00, 55-gallon stainless steel, \$6.50. Sold only through selected distributors. For more information or to place your order, phone or write:

ELCIDE 75



Lilly's brand of bacterial inhibitor for cutting fluids

new shop equipment

**Descriptions of new machines, tools
and materials for metalworking.**

TEST INDICATOR HAS HIGH MAGNIFICATION AND LONG RANGE

A series of Testmaster Test Indicators, Swiss-made to a high standard of precision, are now being marketed by Federal Products Corp., 8144 Eddy St., Providence 1, Rhode Island.

There are eight models in the series; four have 0.0001 inch graduations with 0.032 inch range and four have 0.0005 inch graduations with 0.060 inch range.

Of satin chrome finish, these test indicators are made in both the horizontal and perpendicular models. There are two sizes of dials available in both styles; one is the regular size

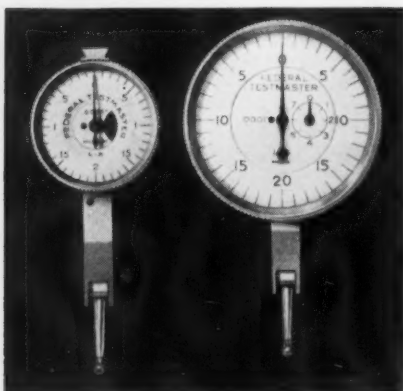
of 1 inch and the other is 1½ inches. The large dials provide 50 percent more magnification than the regular size dials. Low friction operation is obtained through the use of ball bearing pivots. The contact is clutch mounted with 180 degree rotation.

For more data circle 67 on Postpaid Card

★ modern machine shop ★

MINIATURE BORING HEAD

Precision Tool and Manufacturing Company of Illinois, 1305 South Laramie Ave., Cicero, 50, Ill., has announced the A-1 Miniature Deka-Bore Boring Head, which is a precision bor-



Federal Products Model L Swiss Testmasters



A-1 Miniature Deka-Bore Boring Head

and shop materials

Edited by L. L. BALDHOFF

new
shop
materials

ing tool with an offset feature to compensate for tool grinds, yet is so small it can be held in the palm of the hand. This head is only $2\frac{1}{4}$ inches in diameter and $1\frac{15}{16}$ inches long. It weighs just 22 ounces.

This head will hold quills up to $\frac{1}{2}$ inch in diameter. Incorporated into this head is the Deka-Dial, which permits positive 0.0001 inch adjustments without backlash. In addition, it has a calibrated micrometer screw that can offset the tool slide to compensate for tool grinds. With the A-1 Miniature Deka-Bore, adjustments of up to $\frac{1}{8}$ inch can be made on the diameter.

For more data circle 68 on Postpaid Card

★ modern machine shop ★

LONG NEEDLE POINTS

Long needle points, ground on various lengths and diameters of wires, as shown in the accompanying illustration, are being produced by Robert A. Main and Sons, Inc., 28 Pascack Rd., Paramus, N. J. Various lengths and shapes of points can be ground on all types of ferrous and non-ferrous wires in diameters from 0.020 to $\frac{1}{2}$ inch, in lengths from $\frac{1}{4}$ inch up to 20 inches. These parts can have secondary operations performed on them, such as primary angle bending, heading, flattening and knurling. Parts are made to exact customer specifications and some

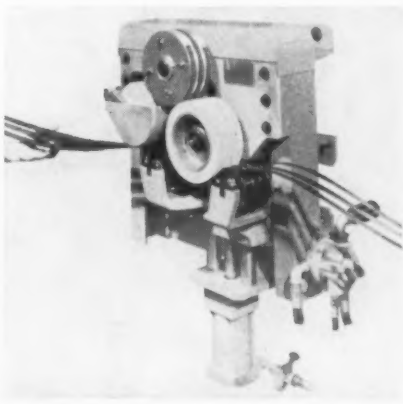
sizes are carried in stock. Parts can be heat treated and bright polished.

For more data circle 69 on Postpaid Card

★ modern machine shop ★

OFFSET UNIT PRINTS THREE STEEL BANDS SIMULTANEOUSLY

Manufacturers of steel bands and other similar products can now attractively print three coils of stock simultaneously with an in-line offset printing unit, recently developed by Jas. H. Matthews and Co., 3944 Forbes St., Pittsburgh 13, Pa. Incorporating three individual type wheels, holding either



Matthews In-Line Offset Printing Unit

new shop equipment . . .

identical or differing data and an extra wide printing blanket, the unit can print one, two or three bands simultaneously with characters from $\frac{1}{8}$ to $\frac{3}{4}$ inch. The printer is friction driven by the material passing on the production line, so that printing speed will always correspond to line speed.

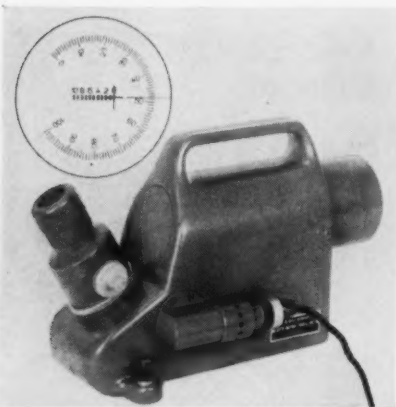
For more data circle 70 on Postpaid Card

★ modern machine shop ★

AUTO-COLLIMATOR

The Leitz-Wetzlar Precision Auto-Collimator has been announced by Opto-Metric Tools, Inc., 137MM Varick St., New York 13, New York.

This instrument departs from the traditional telescope design to increase its sturdiness, handiness and portability. The result is not only a compact optical tool, but one that is completely self-contained and independent of any mounting fixture, to the extent that even the ocular is rotatable against stops over an exact 90 degree



Leitz-Wetzlar Precision Auto-Collimator

quadrant for measurements in two planes.

For more data circle 71 on Postpaid Card

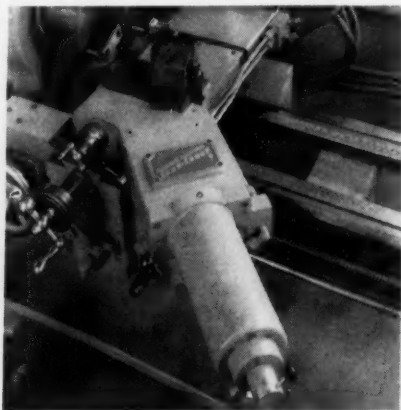
★ modern machine shop ★

LATHE TRACER ATTACHMENT PROVIDES WIDE VERSATILITY

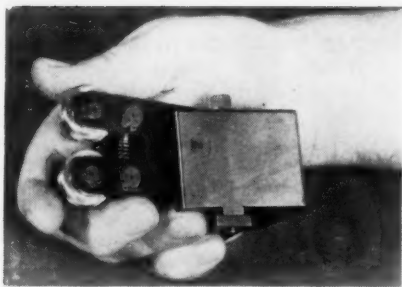
A lathe tracer attachment, providing wide versatility and used by both skilled and unskilled operators, has been developed by True-Trace Sales Corp., 9830 East Rush St., El Monte 38, California.

Based upon the precision True-Trace hydraulic 180 degree single dimension tracer, the attachment is adaptable to virtually all makes of lathes. The manufacturer states that it allows relatively unskilled labor to perform such turning applications as step shaft tracing, contour turning and facing operations. The attachment converts standard lathes to contour machines, and yet it still permits normal turning by the lathe, inasmuch as the manufacturer has kept cross and longitudinal screws intact.

For more data circle 72 on Postpaid Card



True-Trace Lathe Tracer Attachment



Sheffield No. 250 Precision-Rol Attachment

ATTACHMENT ROLLS THREADS UP TO 1/4 INCH OUTSIDE DIAMETER

A thread rolling attachment for rolling threads up to 1/4 inch o.d., that can be used on the "00" Brown and Sharpe and 9/16 inch Acme-Gridley without machine modification, has been announced by The Sheffield Corp., Dept. 12, Dayton 1, Ohio.

Designated as the No. 250 Precision-Rol Thread Rolling Attachment, it has been designed for rolling threads from No. 0-80 to No. 1/4-20 with maximum thread width of 1/2 inch.

For more data circle 73 on Postpaid Card

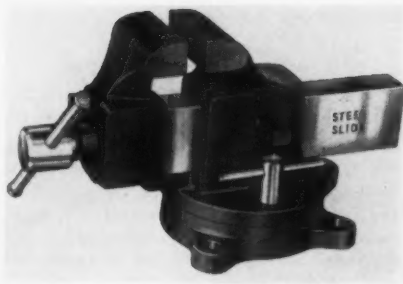
★ modern machine shop ★

MACHINISTS VISE

The Desmond-Stephan Manufacturing Co., Urbana, Ohio, has announced newly designed machinists vises with several important improvements in construction.

Hardened tool steel jaw inserts eliminate screw holes and screw heads in the jaw surface and increase gripping area. Jaws are firmly pinned on and can easily be replaced when worn.

Positive locking of the swivel base models in any position is assured with a corrugated head, forged steel bolt meshing into vee shaped grooves in the base. Interchangeability of swivel



Desmond-Stephan Improved Machinists Vise

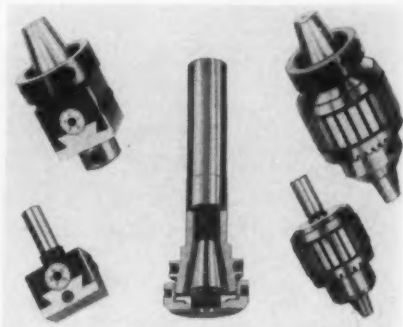
and stationary base models can be obtained by removing or adding the swivel base.

For more data circle 74 on Postpaid Card

★ modern machine shop ★

COLLET AND TOOLHOLDER FOR JIG BORER

Linley Brothers Co., 671 State St., Ext., Bridgeport 1, Conn., has designed a collet and toolholder setup for faster operation and extreme concentricity in jig boring. This design uses, in a tapered spindle bore, a split tapered collet with a compensating washer and locknut. True concentricity



Collet and Toolholder for Linley Jig Borer

new shop equipment . . .

of tools and toolholders is achieved through the action of the free-riding compensating washer, without dependence upon the locknut alignment. Consistent parallel accuracy within tenths is said to be assured for small drilling and boring operations.

For more data circle 75 on Postpaid Card

★ modern machine shop ★

COIL WEIGHT AND LENGTH CALCULATOR IS OFFERED FREE OF CHARGE

The F. J. Littell Machine Co., 4163 North Ravenswood Ave., Chicago 13, Ill., is offering free of charge a Coil Weight and Length Calculator. The inside and outside diameter of the coil and the width and thickness of the stock are all that the user needs to know in order to operate the Littell Calculator.

Operation of the calculator involves two simple steps. Step I shows the pounds per inch width figure for any

combination of i.d. and o.d. Step II uses the pounds per inch width figure as a basis for instant indication of both the total weight and the number of feet in the coil. All calculations are automatic, timesaving and accurate and are conveniently done on one side of the calculator.

Figures shown on the face of the Littell Calculator are for steel coil stock. Aluminum coils can be calculated by simply taking one third of the weight figures given. In figuring brass stock, ten percent is added to the steel weight figures.

For more data circle 76 on Postpaid Card

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TEE NUT AND STUD SETS

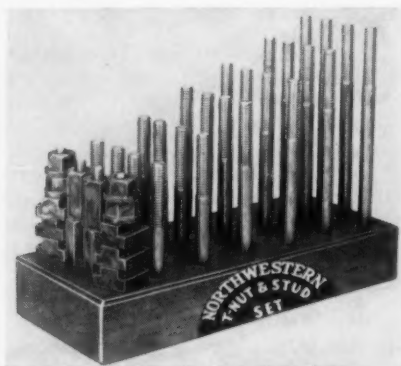
The addition of Tee Nut and Stud Sets to its line of hold down tools has been announced by Northwestern Tools, Inc., 119 Hollier Ave., Dayton 3, Ohio.

The sets are available for tee slots in $\frac{3}{8}$ through 1-1/16 inch widths. Each set includes: four each of 3, 4, 5, 6, 7 and 8 inch studs, four flanged nuts, four coupling nuts, six tee nuts to fit the machine and a handy holder.

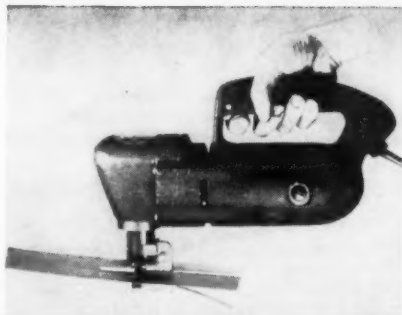
For more data circle 77 on Postpaid Card



Littell Coil Weight and Length Calculator



Northwestern Tee Nut and Stud Set



Modern Portable Electric Nibbler

PORTABLE ELECTRIC NIBBLER

A portable nibbler that will cut woven wire, wire cloth and gasket up to 3/16 inch has been announced by Modern Manufacturing Co., Inc., 680 Davisville Rd., Willow Grove, Pa. It can be used as a portable tool or mounted on a table.

It will also cut sheet metal without distortion by cutting out a continuous 1/4 inch strip. Two models are available: one for cutting up to 3/32 wire, and a heavier duty for cutting up to 3/16 wire. The unit operates on 110 volt, alternating or direct current.

For more data circle 78 on Postpaid Card

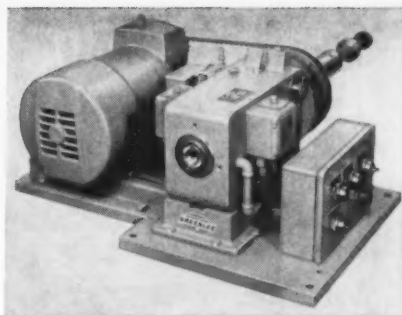
★ modern machine shop ★

PACKAGED BORING UNIT

Greenlee Brothers and Co., 1883 Mason Ave., Rockford, Ill., has developed a compact, packaged boring unit, the Model S-7 Hydro-Borer with 1 3/4 inch diameter spindle.

This packaged boring unit is an extremely close tolerance boring machine that makes it possible to put precision boring right into production assembly.

The S-7 Packaged Boring Unit is completely flexible and adaptable. It has been designed specifically for



Greenlee Model S-7 Hydro-Borer Boring Unit

mounting on jigs, fixtures and multiple station machines.

For more data circle 79 on Postpaid Card

★ modern machine shop ★

INTERCHANGEABLE COUNTERBORING TOOLS

Heavy duty counterbores, with either high speed steel or carbide tipped cutters, are now available from National Twist Drill and Tool Co., Rochester, Michigan.

The Spline-Taper Drive feature insures permanent alignment and allows complete interchangeability of pilots, cutters and holders. A wide range of counterboring and counter-



National Interchangeable Counterbore

"Do-It-Yourself" **Saves Hours** **Cuts Costs**



Why let someone else set your production schedules? If you now depend on outside heat treat sources, consider all the advantages of heat treating tools, dies, parts, etc., right in your own shop with a versatile TEMCO electric furnace. No bother with time-wasting pickup and delivery of work...no downtime while waiting for it to come back. Saves hours on jobs. Cuts costs...for TEMCO furnaces are economical to own and operate. Easy to hook up...easy to use. (Shown above is Type 1600 with TEMCOMETER-type controls in new cabinet assembly). The TEMCO line includes eighteen models with chamber sizes from 4" x 3 3/4" x 4 1/4" to 10' x 9 1/2" x 22". \$65.00 to \$973.25 complete with controls. Write for TEMCO-THERMOLYNE catalog information and nearest dealer's name.



ELECTRIC FURNACES
Thermo Electric Manufacturing Co.
488 Huff St., Dubuque, Iowa

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146 modern machine shop

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sinking operation is possible with a minimum of tooling. Simple replacement of worn cutter members gives maximum tool economy.

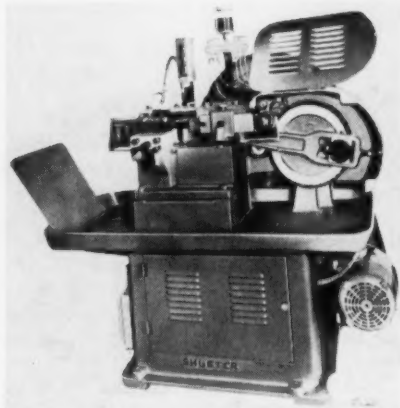
For more data circle 80 on Postpaid Card

★ modern machine shop ★

THREAD ROLLING MACHINE **FOR HEAVY DUTY PRODUCTION**

Mettler Machine Tool, Inc. 157 Adeline St., New Haven, Conn., has introduced a line of thread rolling machines, designed for heavy duty production. These Shuster Thread Rollers are the reciprocating die type and they roll threads, knurls, gimlet pointed wood screws, machine screws and so on, to the limit allowed by the user's supply of dies. Lengths of 2 or 3 inches of thread may be rolled, depending upon the machine used. The machines are available either manually or hopper fed. The maximum thread diameter is 5/16 inch.

For more data circle 81 on Postpaid Card



The Shuster Thread Rolling Machine

December, 1958

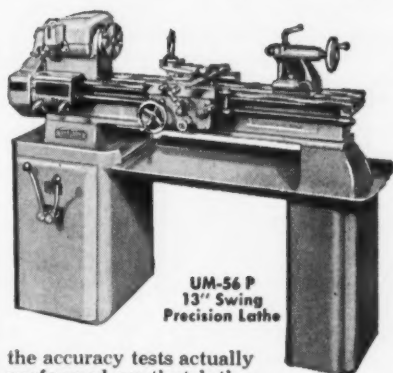
SHELDON Precision LATHES

for the size Lathes You Need Most

Sheldon lathes are built in the sizes you need most, for toolroom and production jobs. They are available with swings of 10", 11" and 13" . . . in varying bed lengths with 18" to 48" center distances . . . and . . . in your choice of pedestal, cabinet or bench mountings.

Powerful, all-V-belt, drive units—either the standard 8-speed (or 16-speed) E-drive; or the production favorite, a rapid, lever-shift U-drive. Where higher spindle speeds are desired, the standard E-drive can be built to provide speeds up to 2,000 r.p.m.

All Sheldon Lathes have handscraped, built-in precision. Each lathe is guaranteed to meet or surpass the American Standards for Toolroom Accuracy. With every Sheldon Lathe goes a copy of

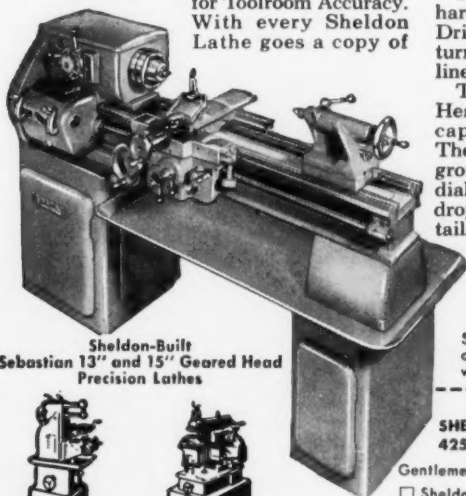


UM-56 P
13" Swing
Precision Lathe

the accuracy tests actually performed on that lathe. (19 checks).

Important optional features include: hardened bed ways, L00 Long Taper Key Drive spindles, 4" D1 Camlock spindles, bed turrets, taper attachments and a complete line of toolroom and production accessories.

The new Sheldon-built Sebastian Geared Head Lathes have greatly increased work capacity and many advanced features. These include a wide, heavy, hardened and ground bed . . . easy shifting spindle speed dial . . . 60-pitch gear box . . . independent drop lever apron clutches . . . cam-action tailstock clamp . . . and, automatic lubrication in the headstock and apron with "1-shot" lubrication of carriage.



Sheldon-Built
Sebastian 13" and 15" Geared Head
Precision Lathes



SHELDON
Horizontal Milling Machine



SHELDON
12" Shaper

SHELDON MACHINE CO., Inc.

Builders of Sheldon Lathes, Milling Machines, Shapers and Sebastian Lathes.

4250 North Knox Ave., Chicago 41, Ill.

Send in coupon or write for catalogs and names of nearest Sheldon and Sebastian Distributors where you can see these new lathes in operation.

SHELDON MACHINE CO., INC.
4250 North Knox Avenue, Chicago 41, Illinois

Gentlemen: Please send new catalogs describing:

- ☐ Sheldon 10", ☐ 11" ☐ 13" Lathes
☐ Sebastian 13" and 15" Geared Head Lathes
☐ Horizontal Milling Machine ☐ Name of Local Dealer
☐ Sheldon 12" Shaper ☐ Have representative Call

Name _____ Title _____

Company Name _____

Street Address _____ ☐ Company Home

City _____ State _____

For more data circle 406 on Postpaid Card

December, 1958

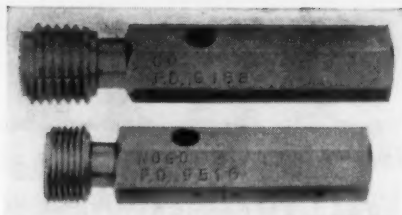
modern machine shop 147

new shop equipment . . .

THREAD PLUG GAGE

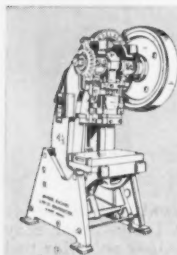
Threadwell Tap and Die Co., Greenfield, Mass., recently introduced the Black Diamond Thread Plug Gage.

This gage features increased resistance to wear and abrasion which the company claims will, under normal operation, provide unusually long life.



Threadwell Black Diamond Thread Plug Gages

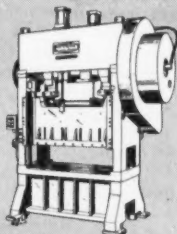
All Threadwell Thread Plug Gages, from No. 0 through 1½ inches, fea-



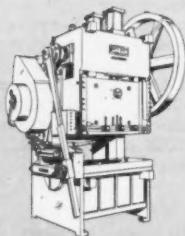
13 models
from 16 to 150
ton

INCLINABLE

Single and
Double Crank from
40 ton to 200 ton



STRAIGHT SIDE

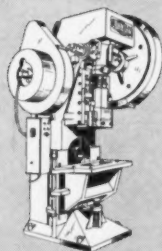


GAP

60 ton
to 200 ton

HORN

60 ton model
in flywheel and
back geared type



"Specs" on 34 models in
one easy reference folder

Be sure your file has this quick
reference folder on hand. Lists
all models in Inclinable, Straight
Side, Gap and Horn presses.

Write for Bulletin 1958



Johnson

POWER PRESSES

JOHNSON MACHINE & PRESS CORP.
620 WEST INDIANA AVENUE, ELKHART, INDIANA

For more data circle 407 on Postpaid Card

TAPMATIC'S NEW

TAPPING ATTACHMENTS

WITH the features YOU demanded

- Simplified trouble-free construction
- Universal adaptability
- Positive depth control
- Either right or left-handed operation

**PLUS Tapmatic's Famous
TORQUE TONE CONTROL**

WEIGHTLESS FLOATING ACTION

Now the world's most complete line of tapping attachments for reversing or non-reversing spindles. Your choice of seven profit-making models. Manufactured in the U.S.A.

Write or wire for literature.



TAPMATIC

C O R P O R A T I O N

845 West 16th Street • Costa Mesa, California

Phone Liberty 8-3404



For more data circle 408 on Postpaid Card

December, 1958

modern machine shop 149

new shop equipment . . .

ture unusual hardness and increased wear life through a newly developed surface treatment.

For more data circle 82 on Postpaid Card

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MOTOR DRIVEN CENTRALIZING REEL

U. S. Tool Co., Inc., Ampere (East Orange), N. J., has announced its Model ACR-1642 Motor Driven Centralizing Reel.

The centralizing arrangement is controlled by a handwheel and the cross members, to suit the i.d. of the coil, expand or contract depending upon the direction or rotation of the wheel. The four cross members expand and contract simultaneously. The entire operation is simple and quick.

The specifications for this reel are as follows: it is suitable for material up to 16 inches in width, i.d., from

14½ to 22 inches, o.d. 42 inches at 16 inch i.d., weight capacity is 2,500 pounds; 2 h.p. motor for operation on 220/440 volts, three phase, 60 cycle, alternating current.

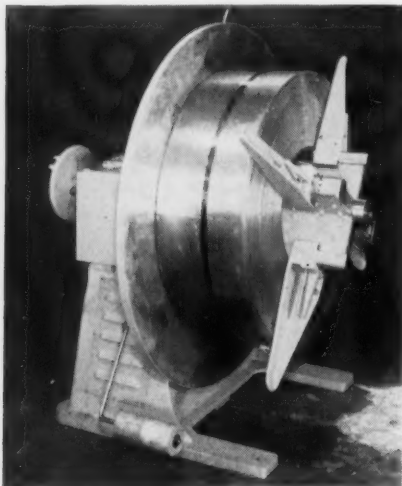
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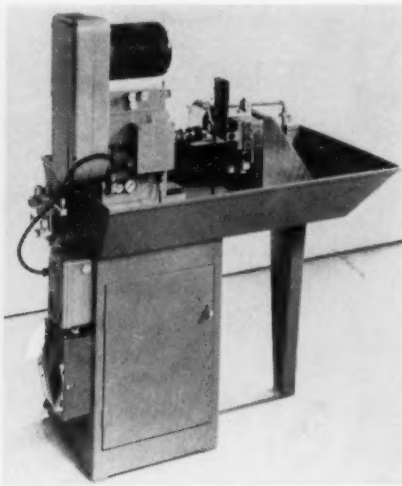
SINGLE SPINDLE HORIZONTAL DRILLING AND TAPPING MACHINE

Universal-Automatic Corp., 9545 Ainslie St., Schiller Park, Ill., has introduced a single spindle horizontal drilling and tapping machine, which has been designed with a full range of automatic controls and provided with magazine feed to handle the large variety of second operation drilling, tapping, counterboring, burring, countersinking, facing, reaming and hollow milling operations on screw machine parts, die castings, stampings or headed parts.

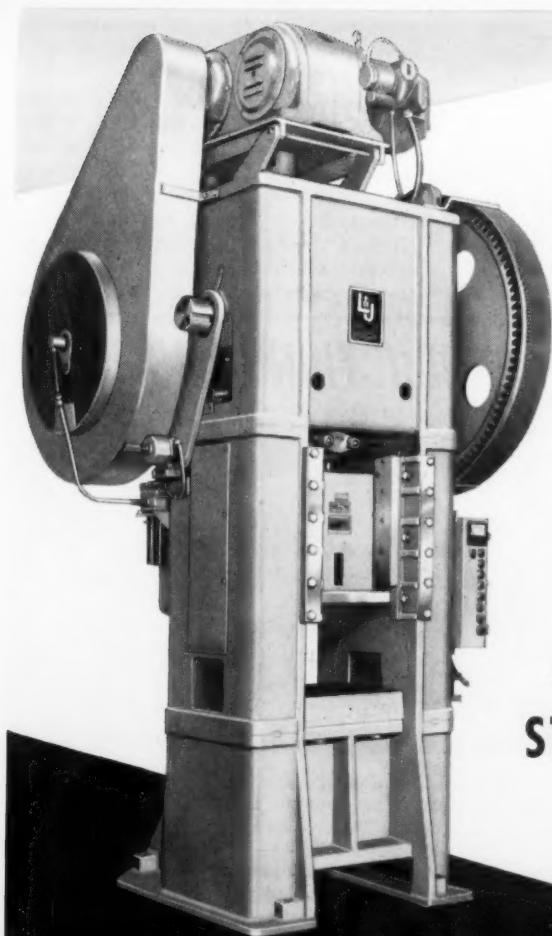
Capacity is 0.020 to ⅜ inch drilling in mild steel and up to ⅜ inch tapping.



U. S. Model ACR-1642 Centralizing Reel



Horizontal Drilling and Tapping Machine



New
L & J

**SINGLE CRANK
STRAIGHT SIDE
PRESS**

STANDARD EQUIPMENT

Air clutch and brake. Four square type gibs with bronze surfaced ways on ram. Hard bronze crankshaft bushings and ball seat. Ram counter-balances. Forced lubrication, J.I.C. controls, etc.

Write — Bulletin L-18 on 20 to 150 ton single and double crank straight side presses... also, 30 to 75 ton gap frame presses.

- 150 ton capacity adaptable to many jobs.
- Plain flywheel or back geared type.
- 6½" dia. main bearings, 9" dia. crank pin.
- Dimensions of bed and ram face, stroke length and shut height available as required.
- Extra heavy box type steel weldment tie rod construction.
- Rigid, accurate for precision and long die life.

L & J PRESS CORPORATION, 1624 Sterling Ave., Elkhart, Ind.
For more data circle 409 on Postpaid Card

December, 1958

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new shop equipment . . .

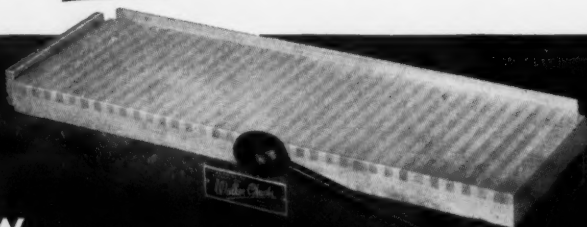
A 1/2 h.p. spindle motor and drive pulleys provide a normal speed range between 500 and 10,000 r.p.m. Adjustable spindle speed is obtained with compressed air through a 2 1/2 inch maximum stroke length by means of intake and exhaust metering screws for both top and bottom of the tandem piston rod assemblies. This is supplemented by hydraulic control adjust-

ment for break-through or controlled feed operations on any portion of 2 inches of spindle travel.

A bottom dwell control furnishes additional control for fine surface finishing and holds repeatable depth limits within 0.0005 inch. The universal positioning and clamping fixture permits depth location from either the back of the part or the front face of shoulders or flanges.

For more data circle 84 on Postpaid Card

INCREASE YOUR PRODUCTION EFFICIENCY!



NEW O. S. WALKER PERMANENT MAGNETIC CHUCKS*...

The most complete, most modern line of magnetic chucks, with the most permanent magnets ever produced. The ceramic magnets have many times the coercive force of alloy magnets. The face is *all steel*, with no soft insulating material. Check these important advantages: —

- Weight is 50% less than conventional permanent chucks; minimizes reciprocating table inertia
- Low, low height gives greater-than-ever machine capacity
- Fine pole divisions give maximum holding power
- All magnetic fields are controlled to prevent magnetization of machine tables or ways
- Solid silver-brazed construction for true dimensional stability
- Uniform holding throughout

New Catalog gives comprehensive descriptions and specifications of the complete O. S. Walker line of permanent and electro magnetic chucks. Send for your **FREE** copy today!

**Patent applied for*

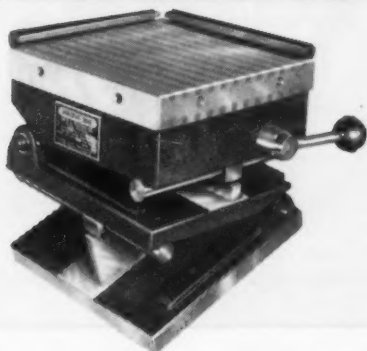


O. S. WALKER COMPANY, INC.

WORCESTER 6, MASSACHUSETTS, U. S. A.

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WHY
Robbins
**IS YOUR
 BEST BUY**



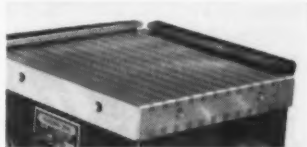
Only Robbins angular tooling equipment assures you positive accuracy when setting up to machine, grind or inspect angular work . . . because only Robbins gives you these exclusive features:

POSITIVE LOCKING locks firmly inside sine bar roll with expanding action for positive lock. Screw at each end locks toward front of unit, always pulls upper member firmly down on gage block without distortion. (Pat. app. for)



"PERMA-FLAT" SWIVEL BLOCK contacts gage block over entire face of swivel block instead of on a single thin line of contact. This patented feature provides greater contact between gage block and unit . . . combines with Robbins positive locking to assure the utmost accuracy.

FINE POLE ceramic magnet chuck, manufactured for Robbins by famed O.S. Walker Company, Inc. Strongest magnetic chuck available. Fine poles make it easier to set up smaller work, go right to the edge for easier setup next to rails.



IN ADDITION, both magnetic and non-magnetic models are built with ribbed base, intermediate and top plates for distortion-free strength and rigidity, with full-length ground roll seats for precision location, greater accuracy. All models make it possible to set up any angular work in just four simple steps . . . in minutes instead of hours! Before you purchase any sine plate, be sure you check Robbins' exclusive features. Write for new catalog!

OMER E.
 11961 DIXIE AVENUE

Robbins
 DEPT. B

COMPANY
 DETROIT 39, MICH.

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new shop equipment . . .

CALIPER

Polyplan Co., 45 West 81st St., New York 24, N. Y., has announced a line of calipers with a reading of 1/1,000th inch. They feature a hinged lower jaw which, in the 10 inch instrument, swings a full 180 degrees and, in the 7 inch one, 360 degrees. This makes the measurement between points on



Polyplan Caliper is shown here in use

two separate axes as simple as between those on a single axis with ordinary calipers.

Another example of the practicality and timesaving features is in the measuring of parts in process of machining, which generally can be effected without having them removed.

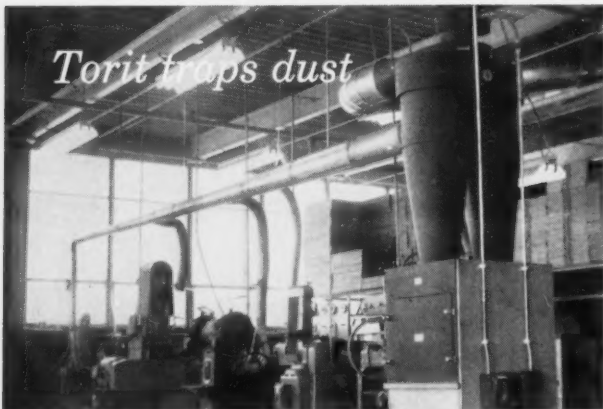
Not an unimportant factor is the scale for angular measurements with the lower swinging jaw. The broad surface of the jaws, in addition to affording a sure and firm grip, will not be affected by friction. An easy and quick reading of the scales is said to be assured by the photographically etched graduation.

For more data circle 85 on Postpaid Card

★ m m s ★

PRECISION SPINDLES

The Standard Electrical Tool



*Six machines protected from dust by Torit for **\$666¹⁵***

This Torit Dust Collector, Model 219FM, complete with accessories, was installed by the Mohr Lino Saw Co., Skokie, Ill., to protect 3 belt sanders and 3 other grinders (2 grinders hidden from view) from destructive dust—at a total cost of just \$666.15!

After one year's operation, Mohr Lino Saw says this about their *low-cost* Torit installation: "The Torit installation has kept our shop *cleaner*, our operators *happy*, and protected vital machinery."

You too can achieve greater machine protection and cleaner working conditions by trapping dangerous or valuable dust *at its source* with a completely *self contained* and *portable* Torit Dust Collector. For full details write to:

TORIT MANUFACTURING CO.

Dept. 703, Walnut & Exchange Sts., St. Paul 2, Minn.

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NEW! NEW! NEW!

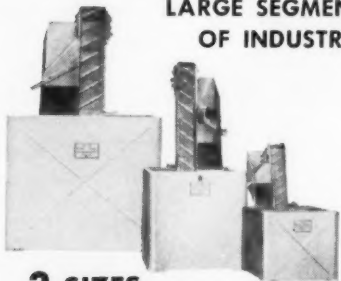
ELEVATING FEEDER

Offering Many Advantages:

Including

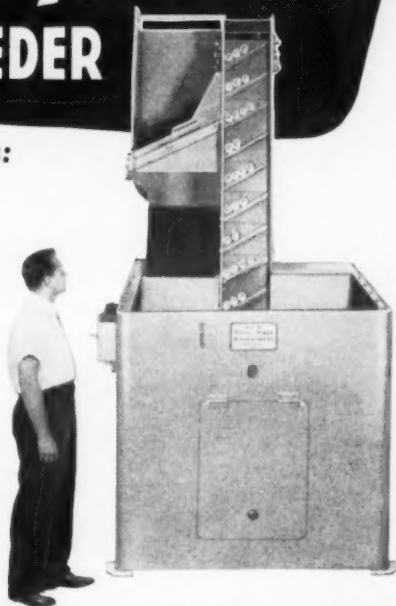
- ▶ **FLOOR LOADING**
- ▶ **BULK STORAGE**
- ▶ **PARTS ELEVATION**
- ▶ **ORIENTATION**
- ▶ **HIGH FEED RATE**
- ▶ **MINIMUM RELOADING**

**PROVIDES A WIDE VARIETY
OF APPLICATIONS TO A
LARGE SEGMENT
OF INDUSTRY!**



3 SIZES

**(20-12-6 cubic feet load capacities)
FOR BOTH LARGE AND
SMALL PIECE PARTS**



● These elevating feeders were developed as a supplement to our existing barrel and bowl feeder lines, keeping in mind the industrial demand for a low-cost, high volume capacity floor load parts feeder. They were designed to feed Presses, Hammers, Grinders, Secondary Machines, Furnaces, Assembly Machines—to mention only a few of their many uses. They represent an outgrowth of D.P.S. long, specialized experience in meeting and solving innumerable feeding problems.

Get full particulars NOW! Write Today.

DETROIT POWER SCREWDRIVER CO.

SUBSIDIARY OF LINK-BELT CO.

2807 W. FORT ST., DETROIT 16, MICH. • Tel: TA. 5-3070

For more data circle 413 on Postpaid Card

December, 1958

modern machine shop 155

new shop equipment . . .

Co., 2487 River Road, Cincinnati 4, Ohio, has introduced its line of boring spindles, which has been designed for precision boring operations using conventional boring tools, diamond boring tools and so on.

The accompanying illustration shows popular boring spindles. Number 1 shows the No. 4308B block type

base. Number 2 is of the No. 4203B flanged base and Number 3 is the No. 4407B piggy back assembly.

These spindles, or the piggy back assembly, are available in a standard design or custom built to suit the individual requirement.

The design on each has been primarily intended to serve original equipment manufacturers and is claimed to represent ideal replacement equipment for existing machines or in

the development of a new specialized type of boring machine assembly.

The manufacturer states that these spindles are produced under ideal laboratory conditions to deliver the maximum in rigidity and precision. They are permanently lubricated and dynamically balanced.

For more data circle 86 on Postpaid Card

New

IDEAL

**GOLD
BAND**

LIVE CENTERS

GUARANTEED TO MATCH ACCURACY
AND CAPACITY OF YOUR LATHES

In the GOLD BAND line Ideal has combined the latest production methods with their traditionally fine craftsmanship to bring you an unequalled standard of excellence in live centers. Accurate, (to $\pm .0001$ ") GOLD BAND Live Centers offer "custom" quality at production prices. Specify GOLD BAND Live Centers and your every need can be accommodated from stock . . . 99 times out of 100. Ideal's GOLD BAND Live Centers offer savings, simplified operations and higher lathe output both in quantity and quality. Contact your distributor today!



A COMPLETE LINE FOR EVERY
NEED—SPECIALS TOO!

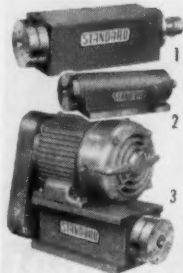


IDEAL INDUSTRIES, Inc.

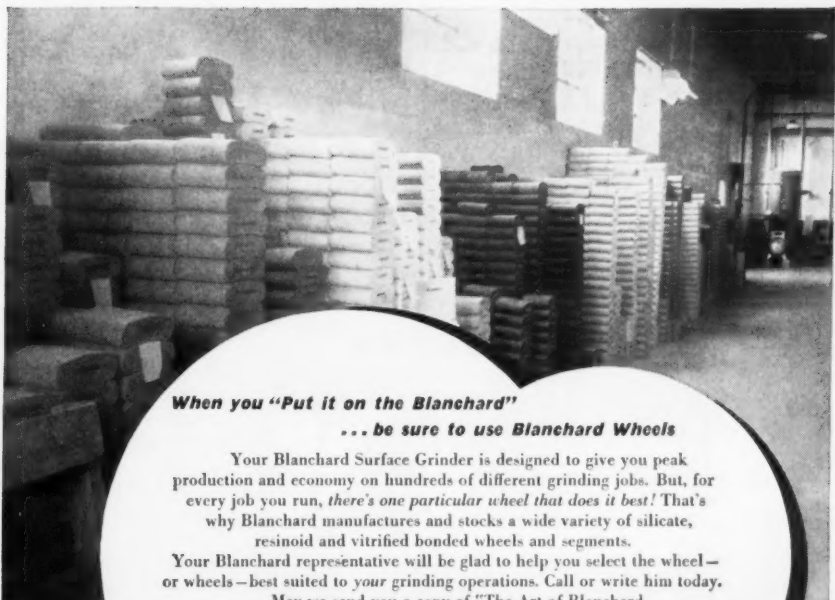
1031-L Park Ave.
Sycamore, Illinois

For more data circle 414 on Postpaid Card

Write for
Complete catalog data
and specifications.



Popular models of
Standard Electrical
Tool Company's line
of Super Precision
Boring Spindles



When you "Put it on the Blanchard"

... be sure to use Blanchard Wheels

Your Blanchard Surface Grinder is designed to give you peak production and economy on hundreds of different grinding jobs. But, for every job you run, *there's one particular wheel that does it best!* That's why Blanchard manufactures and stocks a wide variety of silicate, resinoid and vitrified bonded wheels and segments.

Your Blanchard representative will be glad to help you select the wheel—or wheels—best suited to your grinding operations. Call or write him today.

May we send you a copy of "The Art of Blanchard Surface Grinding" (4th Edition)?

THE BLANCHARD



MACHINE COMPANY

64 State Street

Cambridge 39, Mass., U. S. A.



For more data circle 415 on Postpaid Card

December, 1958

modern machine shop

157

new shop equipment . . .

CARBIDE TIPPED TAPERED PIPE REAMERS

Carbide tipped tapered pipe reamers, stocked finished and ready for immediate delivery, are available in $\frac{1}{8}$ to 3 inch diameters from Wetmore Tool and Engineering Co., 5320 East Washington Boulevard, Los Angeles, Calif. The reamers can be used as a

standard tool to prevent excessive tap wear and tap breakage. A minimum amount of stock is left for the tap to remove.

For more data circle 87 on Postpaid Card

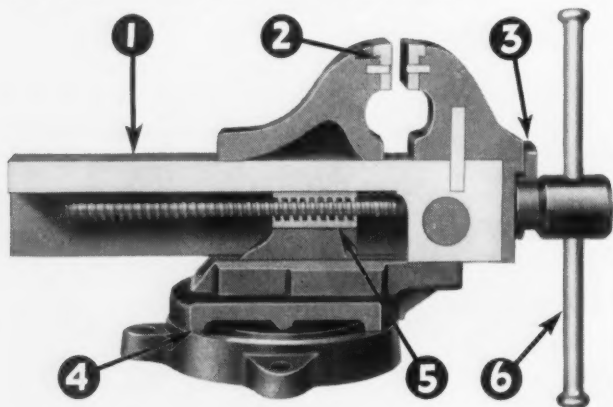
★ modern machine shop ★

NYLON DRILL SLEEVE

James Products Co., 801 Mentor Ave., Mentor, Ohio, has announced an improved James Nylon Drill Sleeve. Made of virgin nylon, this drill sleeve has been designed to eliminate drill breakage and to protect spindles and quills from damage. The sleeve will break, not the drill, when the drill hits a hard spot or air hole and stops.

Several important benefits of

extra vise features



no extra cost

It makes sense to standardize on Desmond-Simplex vises. You pay no more, but you get more: 1. All-steel slide, milled from "the solid." 2. Step-milled jaw inserts. 3. Outside screw retainer. 4. Full 360° swivel base. 5. Longer, stronger vise nut. 6. Non-pinching type handle. Write for catalog and name of your Desmond distributor.

Desmond-Simplex

STEEL SLIDE VISES

THE DESMOND-STEPHAN MFG. CO., Urbana, Ohio
For more data circle 416 on Postpaid Card

158 modern machine shop

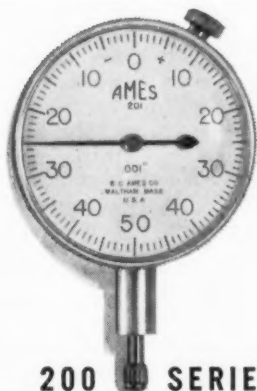


James Drill Sleeve

December, 1958

AMES

Masters of Measurement



200 SERIES

One of four sizes; made
to AGD specifications.

PORTA-CHECK®

A transistorized comparator
for fast, accurate measure-
ment to .00001".



For more than half a century,
Ames measuring instruments
have been regarded as the
finest available. Wherever pre-
cision is *really* important...
you'll find Ames indicators,
gauges, micrometers and com-
parators on the job.

Representatives in Principal Cities



B. C. AMES CO.

29 Ames Street, Waltham 54, Mass.

Canadian Office — B. C. Ames Co., 45 Oriole Parkway, Toronto

MANUFACTURERS OF MICROMETER DIAL INDICATORS AND GAUGES
For more data circle 417 on Postpaid Card

December, 1958

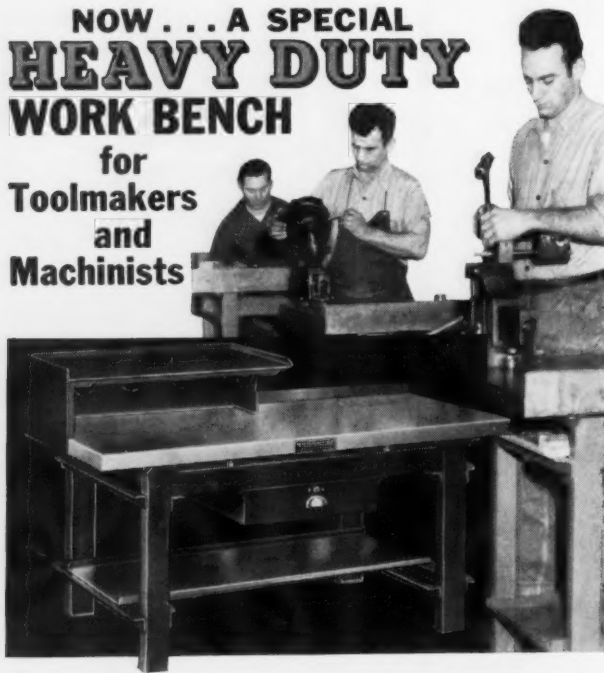
modern machine shop 159

new shop equipment . . .

this drill sleeve are that it will not score spindles, does not bind, is not subject to damage by electrolytic corrosion, is unaffected by coolants, oil, gasoline or grease and it absorbs heavy shock and vibration. It is produced in Morse Taper sizes 1-2, 2-3, 3-4 and 4-5. For more data circle 88 on Postpaid Card

NOW . . . A SPECIAL HEAVY DUTY WORK BENCH

for
Toolmakers
and
Machinists



CHALLENGE HEAVY DUTY WORK BENCHES provide a large two inch thick semi-steel working surface, planer-finished to "surface-plate smoothness" . . . This heavy, solid construction is a real aid to production work. Convenient tool shelves and locked-drawers are available. Made in a combination of two styles and a range of four sizes. Write for full details today.

SE-121

**THE CHALLENGE MACHINERY CO.,
GRAND HAVEN, MICHIGAN**

For more data circle 418 on Postpaid Card

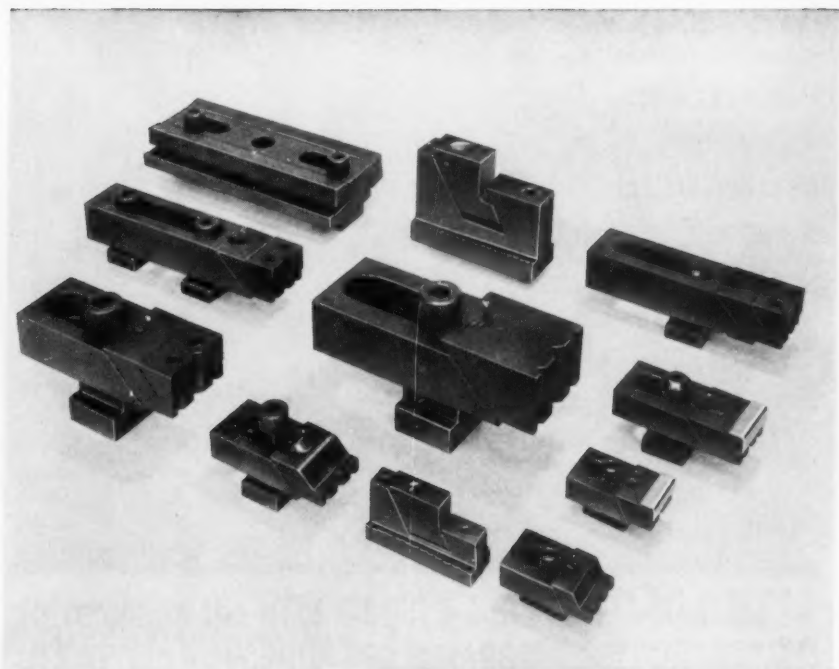


BRUSH MECHANISM FOR CLEANING DIES ON DIE CASTING MACHINE

A new brush mechanism for its ram automatic die casting machine was recently announced by DCMT Sales Corp., Department DR 1128, Port Washington, N. Y. The mechanism is said to insure removal of the casting from between the dies and at the same time, to clean the die faces of

flash and foreign matter. The brushes are set in a completely adjustable holder to take cone variations in die contour and each segment of the set of 12 brushes can easily be removed and replaced when worn. The operation is part of the fully automatic cycle and is controlled from a separate electronic panel. The DCMT R a m Model requires no operator and it produces zinc alloy castings up to one pound in weight at production rates of approximately 1,500 per hour.

The following are features of the machine: completely automatic fail safe cycling; automatic die cleaning and lubricating mechanism;



Where you can get...

DOWN-HOLDING DEVICES for any machine table or face plate

J & S All-Purpose Jaw Clamps eliminate U-Clamps, Straps and Fingers for lathes, planers, milling machines, boring millers, jig borers, etc.

Faster Set-up with any of the 5 Models of J & S Jaw Clamps—one adjusting screw has a holding force of 2½ tons on the Small Model, to 12 tons on Jumbo Model for positioning and holding the work-piece.

Single powerful clamping action obtained from the 45° angle inward and downward movement of the jaw clamp is easily applied and controlled.

Compact, efficient design of J & S Jaw Clamps eliminates the usual obstruction problems — no interference with measuring tool readings.

See your industrial distributor or write today for free literature.



CLAMPCUT — THE BARS —

J & S TOOL CO., INC.

**871 DORSA AVE.
LIVINGSTON, NEW JERSEY**

For more data circle 419 on Postpaid Card

December, 1958

modern machine shop 161

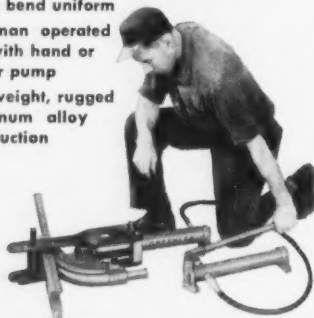
fast, easy way to bend pipe and conduit

GREENLEE
lightweight
**HYDRAULIC
PIPE
BENDER**



Quickly produce your own bends in pipe or conduit for a neat, *exact* fit . . . where and *when* needed! Saves hours, makes a better job.

- Full 90° bend with one ram stroke
- Handles 1/2" to 2" pipe or conduit
- Every bend uniform
- One-man operated . . . with hand or power pump
- Lightweight, rugged aluminum alloy construction



Attachments available for bending steel, copper, brass, and aluminum tubing in sizes 3/4" O.D. to 2 1/8" O.D. Write for details on No. 880 Bender and TU attachments.

Also ask about No. 884 Hydraulic Bender for bending pipe and conduit up to 4" full 90° in one fast stroke.



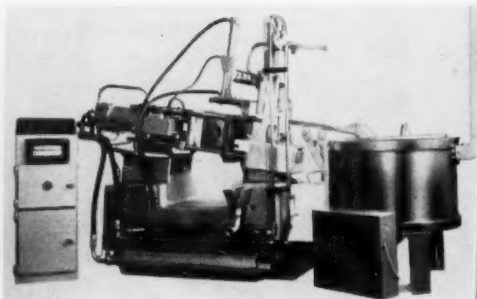
GREENLEE TOOL CO.

1992 Herbert Ave., Rockford, Illinois, U.S.A.

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new shop equipment . . .



DCMT Ram Automatic Die Casting Machine

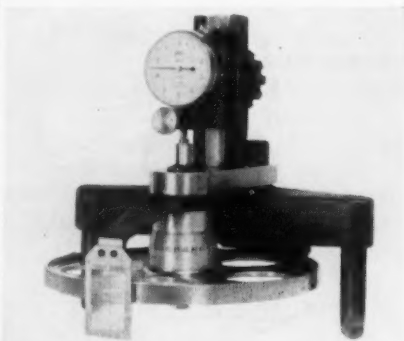
automatic electronic ladling device; automatic die temperature control; separate electronic portable control unit; flash sensing "Di-Saver" safety system; and removable die unit.

For more data circle 89 on Postpaid Card

★ modern machine shop ★

**DEVICE CHECKS ACCURACY
OF DIAL INDICATORS**

A testing device, designed for checking the accuracy of dial indicators, has been developed by the B. C. Ames



B. C. Ames Portable Testing Device

December, 1958



Introducing the NEW MODEL 1-A SEVER-ALL Machine... CUTS AT 3 to 6 SECONDS PER SQUARE INCH—ECONOMICALLY

LOW COST • Priced at less than \$500, delivered.

BIG CAPACITY • Up to 2" square solids, 3½" o. d. pipe and tubing, 3" angle iron, and 4" channels. Wheel oscillation, an exclusive feature in this price range, provides this *above-average* capacity.

SPEED • Cuts a 2" x 2" hardened steel bar in 16 seconds . . . practically any metal at 3 to 6 seconds per square inch.

QUALITY • Clean, smooth cuts, even on large sections, because wheel oscillation provides cooler cutting.

VERSATILITY • Cuts cold rolled, stainless, and alloyed steel; cast iron; and non-ferrous metals.

ECONOMY • Occupies minimum floor space . . . eliminates annealing costs . . . gives more cuts per wheel as a result of oscillation.

SIMPLICITY • Just two SEVER-ALL cutting wheel specifications will do *all* your SEVER-ALL cutting jobs. Little or no set-up time required.

NEW SEVER-ALL AVAILABLE FROM DISTRIBUTORS

Very likely your own distributor already stocks the Model 1-A SEVER-ALL machine and wheels. If not, let us know and we'll give you the name of your nearest SEVER-ALL distributor. We'll also be glad to send you complete details on this new machine. Just ask for Bulletin DH-106.

ALLISON-CAMPBELL DIVISION AMERICAN CHAIN & CABLE

Dept. 931-S, 230 Park Ave., New York 17, N. Y.
For more data circle 421 on Postpaid Card



new shop equipment . . .

Company, 29 Ames Street, Waltham 54, Massachusetts.

Tested by the U. S. Bureau of Standards, the barrel of the testing device was declared accurate to 30 millionths inch. Graduations on its 8 inch diameter ring were found to be accurate to 2 seconds of an arc of the

circumference. The tester proved capable of checking indicators with ranges up to 1 inch, direct to 0.0001 inch.

Light enough to be portable but heavy enough to insure permanent accuracy, the tester has a cast iron base, with three point suspension, tilted to the proper angle for easy reading.

For more data circle 90 on Postpaid Card

WILSON "ROCKWELL"

THE WORLD'S STANDARD OF HARDNESS TESTING ACCURACY

A Complete Library of Helpful Information on Hardness Testing



No matter what hardness testing requirements you have, there's a WILSON instrument to do the job for you. WILSON's library of hardness testing information has data on applications—the principles of the "ROCKWELL" tester—operation—accessories—conversion tables—the full line of WILSON instruments.

Write for complete details on specific machines. Just check the bulletins of particular interest to you.



- ☐ **DH-325**—WILSON "ROCKWELL" Hardness Testers, for most hardness testing requirements.
- ☐ **DH-326**—"ROCKWELL" Superficial Hardness Testers, for extremely shallow indentations.

- ☐ **DH-327**—Special "ROCKWELL" Testers, for unusual applications, including Automatic and Semi-Automatic models.
- ☐ **DH-328**—TUKON Tester, for precision MICRO and MACRO testing.

NAME _____ COMPANY _____

ADDRESS _____

CITY _____ STATE _____

WILSON

MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE
230-G Park Avenue, New York 17, N.Y.

For more data circle 422 on Postpaid Card



For fast, economical cutting of flat metal shapes there are **7** MODELS OF **Campbell Nibbling Machines**

...with cutting capacities ranging from 3/32" mild steel for **MODEL 0** machine to 1/2" mild steel for **MODEL 530**, in sheet sizes from 16" or less, to 72".

CAMPBELL NIBBLERS are making tremendous savings in time and money for hundreds of users in aircraft and other metal-working plants.

...in fast cutting of ferrous and non-ferrous sheet metals or composition sheets.

...for moderate production runs or experimental development work.



Economical
"throw-away"
punch and die



Send for this catalog for complete information on this versatile production and experimental tool

• CAMPBELL NIBBLERS cut from 40 to 60 times faster than drilling or filing. A fast-moving punch (350 to 900 strokes per minute) operating over a die, nibbles out the design, taking a small "bite" with each stroke of the punch.

...for any and all kinds of shapes

...for either inside or outside cuts

...with no distortion of material—no internal strains
—no invisible fractures—no burr

...with a "nibbled" edge that is sufficiently smooth to require very little finishing and sometimes none

CAMPBELL standard punches are made double end to double work life and halve the cost. Prices are so low (starting at 40c each, or 20c per working end) that new punches cost less than regrinding dull ones.

Here is a quick picture of **CAMPBELL NIBBLING MACHINE Capacities**

Campbell Nibbler Model#	Sheet Width	WORKING CAPACITY Sheet Thickness		Strokes per Minute
		Mild Steel	Alloy Steel	
0.....	16"	3/32"	1/16"	900
1A.....	20"	3/16"	1/8"	375-650
430.....	60"	3/8"	1/4"	350-525
436.....	72"	3/8"	1/4"	350-525
530.....	60"	1/2"	5/16"	350-525
2524.....	48"	1/4"	3/16"	375-650
2536.....	72"	1/4"	3/16"	375-650

CAMPBELL NIBBLERS

Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE

931 Connecticut Avenue, Bridgeport 2, Connecticut

For more data circle 423 on Postpaid Card



new shop equipment . . .

AIR JIGS ARE AVAILABLE IN FOUR DIFFERENT TYPES

A line of jigs, which is versatile and is made in four types with each having a large range of sizes, has been announced by The Cleveland Universal Jig Co., 13404 St. Clair Ave., Cleveland 10, Ohio. The OA Type has two rises, standard and high rise, to accommo-

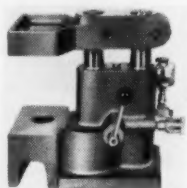
date a large variety of parts. Two types are made to clamp downward by lowering the top plate, which is raised or lowered by the plunger movement, and two styles clamp the part upward to the top plate which is stationary. The manufacturer states that the jigs are very compact and the operation is practically noiseless, exhaust being muffled by means of a silencer.

The speed of the plunger movement can be controlled by two adjusting valves, conveniently located. Seal guards are installed on the plunger to

insure against entering of chips and dirt into any moving part. All moving parts are automatically lubricated.

All of these jigs feature Floating, which in itself is of great importance where it is necessary to move the jigs around while in operation and will only float when in locked position. Loading and unloading is unobstructed on all models. Normal 80 pound pressure is all that is required for operation.

For more data circle 91 on Postpaid Card



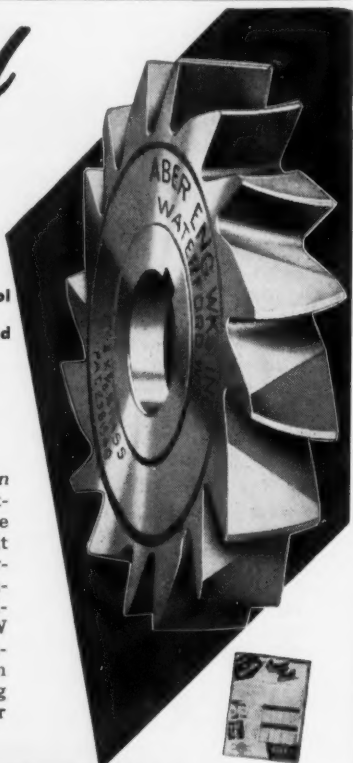
Cleveland Type OA Jig

Curved Tooth

MILLING CUTTERS

1. Give More Accurate Control of Limits and Finish
2. Elimination of Chatter and Breakage
3. Extended Cutter Life
4. Better Performance
5. Increased Production

Patented Curved Tooth Design of all *Aber Cutters* permits faster, easier operation, because the curve of the tooth face is built up and strengthened at the corner of the tooth which first enters the cut. This makes possible a *SHEARING ACTION* and eliminates the shock of contact with the work. Dissipation of heat is faster, eliminating friction. . . . Write today for complete information.



ABER ENGINEERING WORKS

WATERFORD, WISCONSIN

FREE DATA

on "How to Sharpen Curved Tooth Milling Cutters" Helpful Cutter Sharpening instructions for your grinding room.

For more data circle 424 on Postpaid Card



**SWITCH TO
ALCOA ALUMINUM
TOOLING PLATE...
TRIPLE JIG, DIE
AND TOOL
PRODUCTION
WITH LESS LABOR**

That's a mighty big order for any shop, but Alcoa® Aluminum Tooling Plate and Alcoa Tool and Jig Plate can fill it. Here's a case in point. You can make three times as many core blower plates from 100 pounds of Alcoa Tool and Jig Plate as compared to the number obtainable from 100 pounds of conventional tooling plate. Now add these other savings: aluminum machines three times faster with better accuracy . . . machines and tools last longer . . . less maintenance is required.

Slash Labor Costs as Much as 60 Per Cent. Along with aluminum's high-speed machining characteristics, you get all-important light weight for sav-

ings in handling. Because it weighs but one-third as much as iron or steel, changeovers are reduced to a one-man job. An aluminum jig takes less time and work to open, close, move, store or set up.

Call Your Local Alcoa Distributor. Order locally from a wide selection of sizes and gages, cast or rolled. Alcoa Tool and Jig Plate is ideal for high-precision tooling needs. Alcoa 6061-T6 Tooling Plate is a wrought aluminum plate for high-strength utility requirements.

Your Guide to the
Best in Aluminum Value



Aluminum Company of America, 952-M Alcoa Bldg., Pittsburgh 19, Pa.
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December, 1958

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new shop equipment . . .

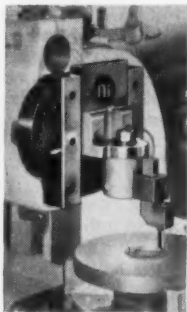
UNIVERSAL SLOTTING ATTACHMENT FOR MILLING MACHINES

The Robert E. Morris Co., REM Sales Division, 5004 Farmington Ave., West Hartford 7, Conn., recently announced the development of a uni-

versal slotting attachment, which enables Nichols Millers to do many jobs formerly requiring a shaper.

This precision built accessory possesses unusual versatility, evidenced by the fact that it can be operated either vertically or horizontally or at any angle in the vertical plane. Additional flexibility is provided by the swivelling clapper box which pivots 90 degrees to the right or left of center,

permitting great latitude in tool and work setup. The unit is mounted in a circular tee slot on the horizontal miller spindle nose and is driven by the miller spindle. The tool slide is hardened and ground steel with inverted vee guideways, mated to scraped alloy iron adjustable retaining gibs. The stroke is readily adjustable up to 2½ inches, with s.p.m. the same as the r.p.

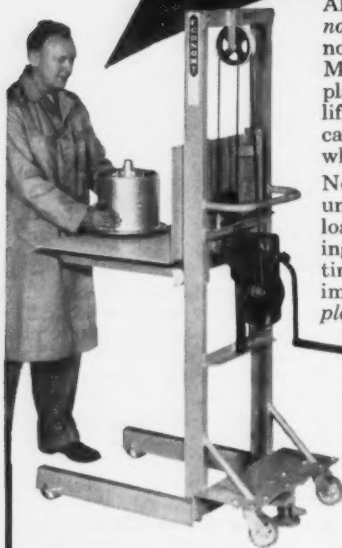


**Slotting Attachment
for Nichols Millers**

**ALL
NEW**

MARK II Shoplifter

\$195⁰⁰ FOB Chicago



All lifters at this price *are not* the same. Compare and note the quality of the new Mark II, which now replaces the Type D Shoplifter. Full 750 lb. capacity can be handled safely anywhere on the platform.

No-drift, full control hoist unit. Raise or lower the load to fractional positioning. Built for years of continuous service with minimum maintenance. *Complete* safety features included at no extra cost.

Applicable in small plants for "too heavy to lift loads" and in large plants to supplement powered equipment. The economical way to transfer molds and dies, unload trucks, stack in narrow aisles, or raise parts and machinery to working levels.

Write for specifications and other details.

**ECONOMY
ENGINEERING**

4507 W. Lake St., Chicago 24, Ill.

For more data circle 426 on Postpaid Card

Acme-Fette rolls threads to tight "specs"



...WITHOUT MAJOR INVESTMENT

The tool engineers of Air-Hydraulic, Inc. were faced with rigid specifications and the necessity of an extremely fine fit and finish for this high temperature hydraulic actuator for aircraft use. Conventional thread cutting methods would have been costly.

After careful study they found that Acme-Fette thread rolling heads would meet all requirements when applied to their existing turning equipment. Major machine investment was eliminated and a low rejection rate meant additional economies because threading was the last of a number of costly operations.

The Results

- 1"-20, 3/4"-16, and 5/8"-24 threads were rolled 5 times faster than possible with conventional thread cutting dies — thread rolling speeds are equal to turning speeds with high speed tool steels.
- Cold-forming action of the Acme-Fette produced a tougher thread and one 60% smoother than grinding or chasing (a 5 micro-inch finish).
- Rejection rate: less than 1/2 of 1%.

For cost-reducing ideas showing how you can put Acme-Fette self-opening thread rolling heads to work on your present equipment, send for Bulletin NAF-57A.

The Material

- Steel: 4340—upset forging
- Tensile strength: over 160,000 p.s.i.
- Hardness: 36-40 on Rockwell C scale

National Acme

THE NATIONAL
ACME COMPANY
183 East 131st Street
Cleveland 8, Ohio

Sales Offices: Newark 2, N. J., Chicago 6, Ill., Detroit 27, Mich.

For more data circle 427 on Postpaid Card

December, 1958

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new shop equipment . . .

m. of the driving spindle. This compact universal slotting attachment is interchangeable with the Nichols Vertical Milling Head and can be mounted on all Nichols Millers of recent manufacture, as well as on older machines that are equipped with the vertical head adapter.

For more data circle 92 on Postpaid Card

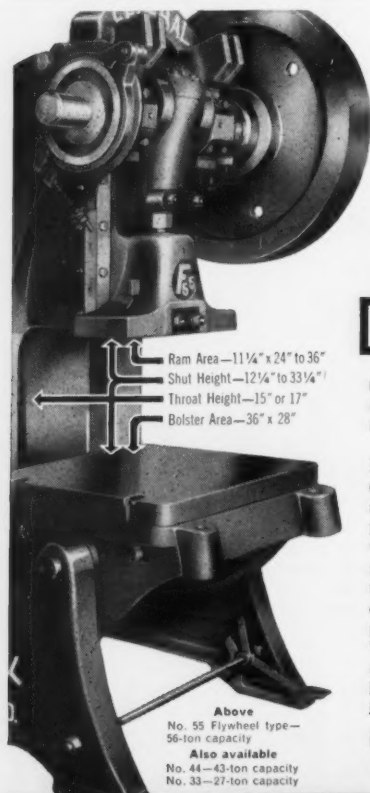
POWER BRUSHES

The Osborn Manufacturing Co., Department B-18, Cleveland 14, Ohio, has announced its Osborn TY Power Brush. The physical and operating characteristics of this brush are as follows: maximum amount of work with minimum brushing pressure; limited degree of flexibility gives a strong, high brushing action strength; maintains constant and uniform brush-

ing action; provides positive control of brush face widths; produces high degree of brushing uniformity from part to part, making possible fine degree of quality control; operates as a safe tool at accepted operating speeds for equivalent standard wire brushes, grinding wheels, abrasive tools and so on; gives reduction in manufacturing costs.

This new power brush will find a ready application in such basic industries as metal fabrication, electrical, glass and machine tool.

For more data circle 93 on Postpaid Card



Ram Area—11¼" x 24" to 36"
Shut Height—12¼" to 33¼"
Throat Height—15" or 17"
Bolster Area—36" x 28"

Above
No. 55 Flywheel type—
56-ton capacity

Also available
No. 44—43-ton capacity
No. 33—27-ton capacity

The
FEDERAL
"55"
gives you

OVERSIZE DIMENSIONS

Eliminates the need for larger,
more costly equipment! Boosts
production on big and bulky jobs!

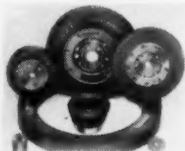
Here's a press that will handle big, bulky jobs ordinarily requiring larger, more expensive equipment. Equipped with foolproof air clutch, its speed is increased many times, safely and with better control. Only the finest components are used in the "55". Workmanship, as in all Federal Presses, is unexcelled. Flywheel or geared. Mechanical clutch standard. Write.

FEDERAL PRESS COMPANY
804 Division St., Elkhart, Ind.

FEDERAL *Open back
Inclinable* **PRESSES**

33 Years of Quality Construction

For more data circle 428 on Postpaid Card



TY Power Brushes

NEW IMPROVED HARD FACING

Tough, hard ceramic coatings provide superior bearing surfaces

Sprayed alumina forms "sapphire-hard" surfaces highly resistant to wear, abrasion and corrosion. Ideal for bearing surfaces, seals.

Development of the new METCO THERMOSPRAY GUN for spraying high-melting-point ceramic materials at low cost opens up a variety of new practical applications. One that has produced a great deal of interest is the use of sprayed alumina coatings for bearing surfaces and mechanical seals. This THERMOSPRAY 101 Ceramic Powder produces surfaces with a hardness of 9.0 on the Moh scale, (only the diamond rates 10.0) with excellent resistance to wear, abrasion and corrosion. When used in combination with special phenolic or furane plastic sealers it provides superior protection against many acids.

Another THERMOSPRAY Powder - 201 - is zirconia which is somewhat softer than No. 101 but provides superior heat-insulating properties. Melting point of this material is 4600° F. and particle hardness 8.0 on the Moh scale.

Hard-facing alloys of the self-fluxing, nickel-boron-silicon type in powder form can also be applied with the Metco Type P THERMOSPRAY GUN. These coatings may be fused, semi-fused, or left unfused depending on the hardness desired, from RC 30 to RC 65, depending on the alloy and the process used.

The new THERMOSPRAY GUN operates without compressed air, only oxygen and acetylene being required. The free-flowing

THERMOSPRAY powders are fed to the flame nozzle from a hopper atop the gun, melted and propelled to the surface to be coated. These materials are sprayed many times faster (up to 15 sq. ft. per hour—.010" thick) than has been possible with equipment previously available. Deposit efficiencies are in excess of 95%. These factors result in extremely low coating costs.

Preliminary engineering data contained in Bulletin 127 covers ceramic coatings while Bulletin 126 covers the hard-facing alloys. Either or both may be obtained by filling out the coupon below or writing on your company's letterhead. No obligation, of course.

The following trade names are the property of Metallizing Engineering Co., Inc. METCO®, THERMOSPRAY. •Reg. U.S. Pat. Off.



Pump rod sprayed with alumina provides superior protection against abrasion and corrosion



**Metallizing
Engineering
Co., Inc.**

1177 Prospect Ave.
Westbury, L. I., New York

Please send me ☐ free Bulletin 127 (ceramic coatings)
☐ free Bulletin 126 (hard-facing).

Name _____

Title _____

Company _____

Address _____

City _____

Zone _____

State _____

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new shop equipment . . .

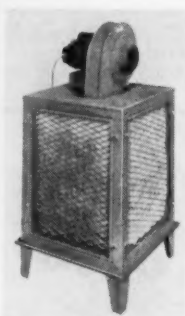
MIST COLLECTOR

A compact, highly efficient mist collector has been introduced, as a part of its new line of mist and fog collecting equipment, by Torit Manufacturing Co., Department 703, 311 Walnut St., St. Paul 2, Minn. Designated as the MC-412, the mist collector has

been especially designed to control mists from wet machining operations that can endanger employee health or create fire and safety hazards. Measuring only 22 inches square, it can be floor mounted on legs or mounted on walls or ceiling in order to conserve space. It measures 47¼ inches high, including its top mounted motor and blower.

This collector requires no high voltage electronic equipment, but filters mist and fog by passing the air through high performance spun glass filters that can easily be replaced. Condensed coolant mist is collected in the bottom of the mist collector where it can be drained for reuse. By means of a connecting tube, the MC-412 system can be connected directly to the machine coolant system for continuous flow.

For more data circle 94 on Postpaid Card



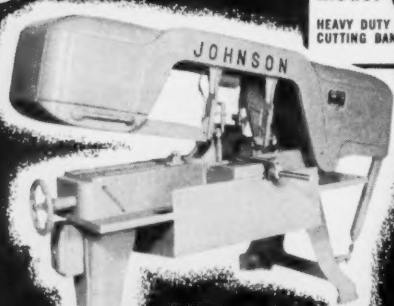
Torit Mist Collector

COMPARE

and you'll get a BIG NEW

J Johnson

model J
HEAVY DUTY METAL
CUTTING BAND SAW



Capacity—10' rounds, 18" flats • Motor—½ hp.
(Any voltage available) • Wheel Diameter—
15" • Floor Space—68" x 31" • Bed—11" wide,
44" long, 6" deep, 24" high • Overall Height
(closed)—39" • Weight—Approx. 750 lbs.
• Speeds—36, 90, 130, 190 feet per minute.



COMPARE the handsome, husky Johnson Model J with any metal cutting saw and here's what you'll find:

- Johnson leads the way in dependable, well-engineered, high performance band saws.
- A Johnson saw will cut anything in your stock pile, and do it faster.
- Johnson saws contain more exclusive construction and performance features that save time and money.
- Johnson saws are the finest metal cutting machines available anywhere—and, at the lowest price!

COMPARE . . . and see for yourself how easily you can save time, labor and production dollars with a Johnson saw. Complete information, prices— are yours for the asking.

Johnson MANUFACTURING CORPORATION
1011 Barnes St., Albion, Michigan

Eastern Distributor
R. J. R. KELLY CO.
Hale Bldg., 51 Main St.
East Orange, N. J.

Midwestern Distributor
W. O. LUNDMARK
75 N. Broadway
Des Plaines, Ill.

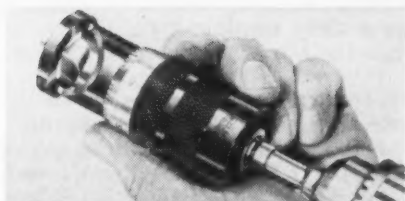
Western Distributor
HASTINGS DISTRIBUTORS
1005 Solano Avenue
Berkeley, Calif.

For more data circle 430 on Postpaid Card

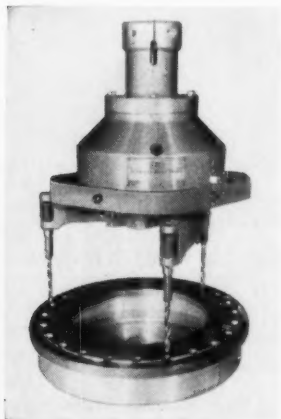
IMPROVED COUNTERSINK TOOL

Schrillo Aero Tool Engineering Co., 8715 Melrose Ave., Los Angeles 46, Calif., has announced its fully adjustable micrometer-stop countersink, which is a fast cutting, lightweight, hand tool which may also be used for volume production work on drill presses, lathes, mills and so on.

The Schrillo Countersink features a hardened and cylindrically ground



Schrillo Improved Micrometer-Stop Countersinking Tool is completely adjustable



Hole patterns can be changed as easily as spindles.

NOW — from **Zagar** A MULTI-SPINDLE ADJUSTABLE HEAD

For Drilling, Tapping and Reaming
with **NEW ENGINEERING
CONCEPTS**

NO UNIVERSAL JOINTS.

NO BULKY GEAR CLUSTERS.

NO FLEXIBLE SHAFTS.

This "ready-to-use" head has whole new possibilities never before obtainable in one unit. It can be used on any standard drill press for any machinable material. Spindle arms can be removed and replaced easily, quickly. Drill practically any pattern within bolt circle as great as 23" dia.

Investment?—moderate. Results?—astounding. Get more details from Zagar representatives, and—

Write for Data Sheets S-1293

Zagar

ZAGAR, INCORPORATED
23898 LAKELAND BLVD.
CLEVELAND 23, OHIO

TOOLS FOR INDUSTRY and SPECIAL MACHINERY

For more data circle 431 on Postpaid Card

December, 1958

modern machine shop 173

new shop equipment . . .

steel alloy shaft operating within an extra large self-indexing bearing. Rapid adjustment for depth of cut is made by retracting the thimble and rotating to any desired position. When released, precise machine cut serrations provide positive locking. Final cut is accurate with plus or minus

0.001 inch limits. In use, a preloaded movement of the shaft assures accurate alignment of the shield with the work.

For more data circle 95 on Postpaid Card

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TOOL BIT HOLDER

Somma Tool Co., 120 Scott Road, Waterbury, Conn., has introduced its

Kwik-Form Tool Bit Holder, which has been designed for fast setups in short runs.

With Kwik-Form, there is no need for special tools; simply hand or surface grind form into standard high speed or carbide tool bit; or even circular grind, using Kwik-Form as a fixture.

Kwik - Form screws right onto the tool post like a form tool and fits front or rear slides for forward or reverse motion. With Kwik-Form it is not necessary to remove the circular form

UNIPUNCH

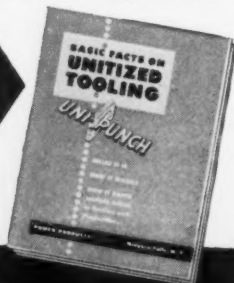
TOOLING IS MORE THAN A PRODUCT

... It is a COST-SAVING METHOD!

The UNIPUNCH METHOD uses a wide range of standard interchangeable units and parts to lower production costs. This method permits any number of units to be set up quickly outside the press, placed on press bed and produce finished parts with first stroke of press ram.

The same group of units may be set up in unlimited patterns keeping the tooling investment in continuous operation for greater savings. THE UNIPUNCH METHOD of UNITIZED TOOLING is a great big economy story.

Write Today
for **FREE**
Methods Book

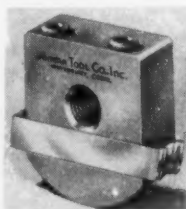


UNIPUNCH

PUNCH PRODUCTS Corporation

3812 HIGHLAND AVE., NIAGARA FALLS, N. Y.

For moer data circle 432 on Postpaid Card



Kwik-Form Holder

tool post when using tool bits on short runs. Kwik-Form is supplied in three sizes with either B. and S. or American Standard Threads.

For more data circle 96 on Postpaid Card

★ modern machine shop ★

STEEL CUTTING TUNGSTEN CARBIDE GRADE

An ultra hard steel cutting tungsten carbide grade is now ready for dis-

tribution by Carmet Division, Allegheny Ludlum Steel Corp., Ferndale, Mich. This grade is called CA-604 and is a companion to other grades in the 600 series.

CA-604 is a super high speed cutting material, which operates in the fast cutting ceramic area. The grade is offered only in indexable blanks.

It combines high velocity finishing with light to medium feeds. One of its major features is its high strength at



**NEW
ALINA
DIAL
COMPARATOR SET NO. 99**

With dependable
3 point
Centralization

**The 3 purpose instrument with unlimited application
in your inspection department**

Use as Dial Indicator graduated to read in .0001".

Use as Bore Gage covering a range of .200" thru
5.090" and reading in .0001".

Use as Dial Test Indicator graduated in .0005".

The No. 99 incorporates a high quality dial indicator together with all the necessary gage heads and extensions. It may be used directly at your machines or clamped to your fixtures. Furnished in handsome plush-lined case.

Dial Test Indicator Set No. 98, a modification of the No. 99, is especially designed for applications where measurements must be taken in deep holes, slots, etc. Write for detailed brochure.



WRITE FOR ILLUSTRATED LITERATURE.

ALINA CORPORATION

122 East Second Street, Mineola, Long Island, New York

Alina Corporation, 853 East 8 Mile Road, Detroit 20, Michigan

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new shop equipment . . .

high cutting temperatures. As with others of the 600 series, this grade will also include the addition of titanium and tantalum carbide in the form of mixed crystal.

It is claimed that this carbide grade will give extra long wear life on such operations as precision boring and

turning, where size tolerances and surface finishes must be held.

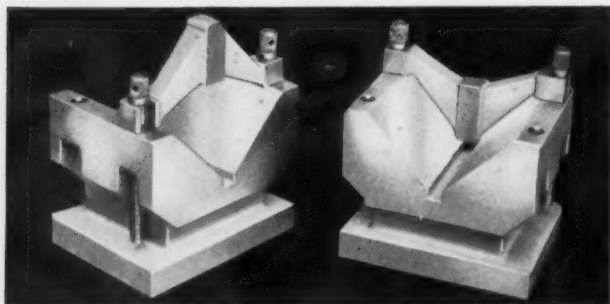
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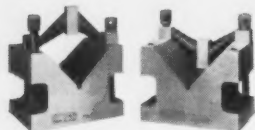
ABRASIVE WHEEL

Simonds Abrasive Co., Tacony and Fraley Sts., Philadelphia 37, Pa., recently introduced its Double XX Depressed Center Abrasive Wheel for weld grinding and general off hand use on portable disc type sanders and right angle grinders. Made like a conventional grinding wheel containing the maximum amount of abrasive cutting particles, it is said to be extremely fast cutting and most popular for general use. It is a rigid type resinoid bond wheel, doubly reinforced to give extra strength and durability.

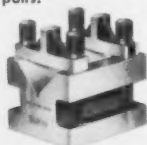
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NEW — No. 9132 Meehanite V-Blocks hold workpieces from $\frac{1}{2}$ " to $3\frac{3}{4}$ " diameter. Sold in matched pairs.



No. 9128-30 V-Blocks are made from alloy steel, hardened and ground. Capacities from $\frac{3}{4}$ " to 3". Sold in pairs.



No. 9131 Universal V-Blocks have an accurate hole in each "V" for quick locating on faceplate or machine table. Maximum capacity — $1\frac{1}{2}$ " diameter. Sold singly or in pairs.

Speed and Simplify Setups with Taft-Peirce PRECISION V-BLOCKS

A complete stock of Taft-Peirce V-Blocks will help you save time and increase accuracy on all types of machining and inspection setups. Working surfaces are precision ground with tolerances in "tenths", and blocks can be used in any position. Reversible clamps may be inverted, swung aside, or slipped off entirely for fast work insertion and removal.

Order Taft-Peirce V-Blocks now — capacities to 8" diameter. Make sure the right pair is ready for your next job. Call your Taft-Peirce representative, or send for Bulletin ST-004 and price list.

TAKE IT TO

TAFT-PEIRCE



WOONSOCKET, RHODE ISLAND

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Simonds Double XX Abrasive Wheel



GEARS

In Stock—Immediate Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send in your blueprints and inquiries.

Send for Complete Catalog No. 20

CHICAGO GEAR WORKS

440-50 N. Oakley Blvd., Chicago 12, Ill.

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JIG BORING

to your specification

At your disposal: Our sub-contract jig boring department, one of the best equipped in the East.

A. K. TOOL CO., INC.

ROUTE 22, MOUNTAIN SIDE, N. J.

Telephone: ADams 2-7300

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COLD EXTRUSION HOBBING!

Here At Last!

Intricate Shaped Cavities are Produced by Cold Extrusion to Precision Accuracy...

Cavities that would be totally impractical to machine are now produced in a single operation and in any quantity. Technique applied to copper, aluminum and hobbing steel.

Lower cost—closer tolerances.



Send drawings of your designs for quotation to:

ANTON MACHINE WORKS

1226 FLUSHING AVE., BROOKLYN 37, N. Y.

For more data circle 437 on Postpaid Card
December, 1958

What is your LUBRICATING PROBLEM?

- ☐ LATHE CENTER LUBRICATION
SCORING-GALLING
- ☐ GRINDING CENTERS
LUBRICANT WASHOUT
- ☐ DRAWING
SCORE MARKS-DIE WEAR
- ☐ STEADY RESTS
WORK PIECE DAMAGE
- ☐ PRESS FITS
SCORING-SEIZING
- ☐ DIE POSTS
WEAR-FREEZING



CMD Lube has solved many like it with excellent results. Perhaps CMD will be your answer, too!

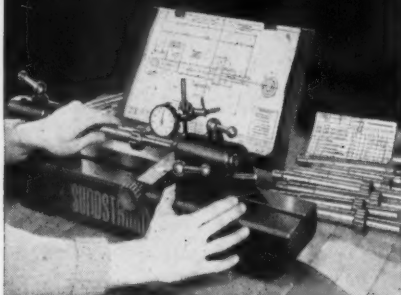
**CHECK AND
SEND IN FOR
SAMPLE**

Anti-Scoring Lubricant
**CHICAGO MANUFACTURING
AND DISTRIBUTING CO.**

1910 West 46th Street, Chicago 9, Illinois

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modern machine shop 177

Keep a Close Check On Accuracy With SUNDSTRAND Bench Centers



Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

6" x 18"	12" x 48"	24" x 48"
6" x 36"	12" x 60"	24" x 60"
12" x 36"	12" x 72"	24" x 72"

FREE Additional Data

covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet 598.



SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

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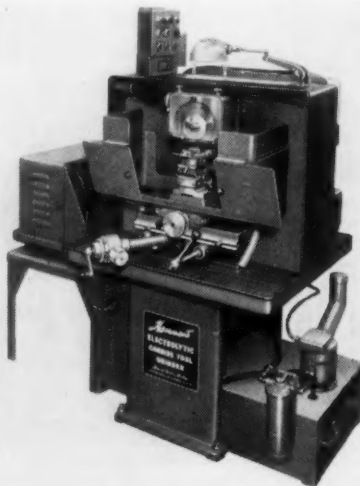
CHIP BREAKER AND OSCILLATING CUP WHEEL GRINDER

Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo, Mich., recently introduced its Model CBE-66 Chip Breaker and Oscillating Cup Wheel Grinder.

This machine combines the company's CBE-6 Chip Breaker Grinder and the SCE-6 Oscillating Cup Wheel Grinder into one machine.

This Hammond Model CBE-66 combination machine, used electrolytically, is claimed to be an ideal all around grinder for complete single point tool grinding. The manufacturer claims the following advantages for the machine; reduced operator fatigue; less grinding time required; and 80 to 90 percent reduction in the consumption of diamond wheels.

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Hammond Model CBE-66 Electrolytic Chip Breaker and Oscillating Cup Wheel Grinder

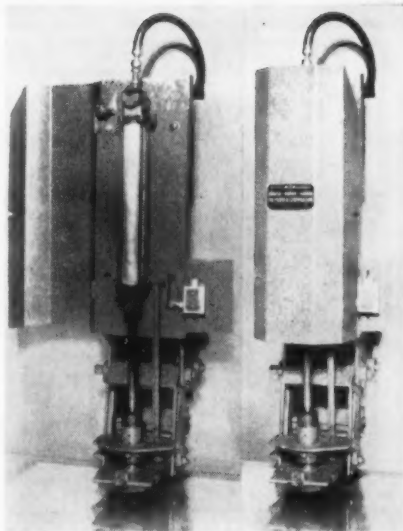
December, 1958

PNEUMATIC VERTICAL MARKER

The Pannier Corp., 409 Sandusky St., Pittsburgh 12, Pa., has announced its pneumatic vertical markers, which are self-inking units that were originally designed for printing steel sheets during the shearing operation, but which adapt easily for marking, in register, on packages, cans, cartons and virtually any other material, including single sheets of paper. The printing head can be equipped for consecutive numbering, solid die printing or with type holder for use with National Type when different setups are required.

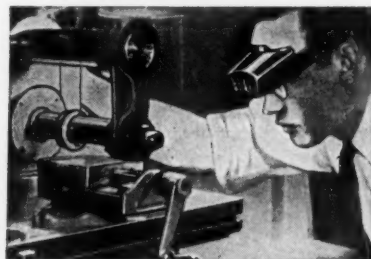
This unit is self-adjusting to variable thicknesses of material being printed and is limited only by the predetermined, customer specified maximums.

The standard printing surface is 4 by 4½ inches for solid dies and type setups. The standard numbering device will take up to seven 1 inch characters. For more data circle 100 on Postpaid Card



Pannier Pneumatic Vertical Markers

People work better when they SEE BETTER®



In Bell Telephone Laboratories:
Precision machinist working on a milling machine finds Magni-Focuser an invaluable seeing aid.

MAGNI-FOCUSER'S

matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER

**SPEEDS PRODUCTION
With Third Dimensional (3-D) Vision
Leaves both hands free to work**

Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeding aid.

Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. \$10.50.

Send for descriptive folder

Edroy Products Co.

Dept. P, 480 Lexington Ave.
New York 17, N. Y.

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REID

TOOL ROOM ACCESSORIES

C. I. HAND WHEELS



SOLID WEB



COUNTER BALANCED

Solid web in dished and straight types. Also counter-balanced. Fine grain cast iron. Rims and handles ground to high lustre. Many sizes. Low prices.

Also hand knobs, ball handles, machine handles, etc. High quality. Low prices.

FREE
78-Pg.
CAT.

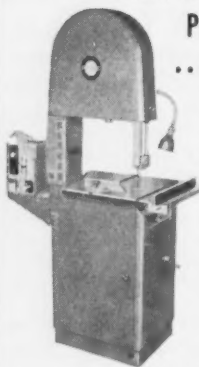
REID TOOL SUPPLY CO.
MUSKEGON HEIGHTS, MICHIGAN

For more data circle 441 on Postpaid Card

The Universal Cutting Machine **PARKS M-2 18" Band Saw**

Cuts **METALS - ALLOYS**
PLASTICS - WOOD

...and it costs
less than \$500!



Here is a rugged, precision-built machine that will cut any materials you work... at the speed best suited for that material—from 50 to 4200 F.P.M. Dual-Range, fully variable gear drive. Priced to fit any shop budget. Write for literature on band saws, wood planers, and radial saws.

The PARKS Woodworking Machine Co.
1511 KNOWLTON ST., CINCINNATI 23, OHIO
Manufacturers of Quality Machines Since 1887

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THROW AWAY CARBIDE TIPS ARE INDEXED FOR FOUR SIDE USE

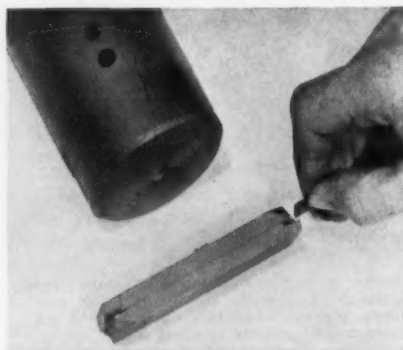
Throw away carbide tips, indexed for four side use and easy to replace in the Maxwell cutter body, are included in the complete new line of carbide cutting tools recently introduced by Maxwell Industries, Inc., 400 East Fifth St., Ashtabula, Ohio.

In addition to the economy of having to replace only the throw away tip after the four sided use has exhausted its cutting capacity, these cutters provide extra savings in the continued use of the tip holder through several tip replacements.

Engineered for quick and easy adjustment, this cutter body saves production time when the carbide tip needs to be indexed or replaced. It is not necessary to remove the bar from the machine to replace or index the tips in the cutter holder.

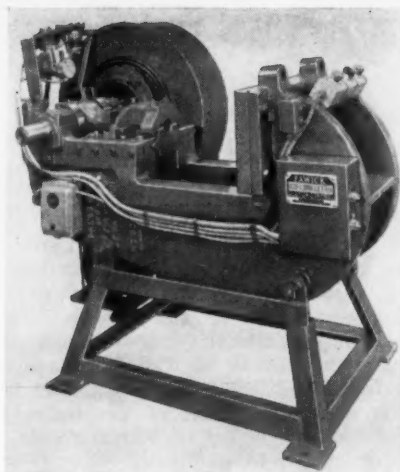
Throw away cutters come in 1/16 inch increments from 1 3/8 to 6 inch diameters for all standard boring and reaming bars using adjustable cutters.

For more data circle 101 on Postpaid Card



Inserting throw away four sided carbide tip into Maxwell reusable cutter holder

December, 1958



Horizontal 30 Ton Press-Rite O.B.I. Press

HORIZONTAL 30 TON PRESS

Ejecting lightweight pieces stamped at high speed is said to be simplified by a horizontal mounting of the 30 Ton Press-Rite O.B.I. Press equipped with air clutch, according to Sales Service Machine Tool Co., Press-Rite Division, 2361 University Ave., St. Paul 14 A, Minnesota.

A fabricated steel base provides a solid footing for mounting the press horizontally. The motor mount has been built onto the base and is provided with a screw adjustment for belt tension. The operating controls are conveniently placed at the front of the machine.

For more data circle 102 on Postpaid Card

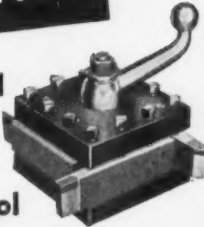
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CROSS ARM BAR TABLE ASSEMBLY

The cross arm bar table assembly, a completely assembled table fixture ready for mounting opposed heads for a variety of machining work in oppos-

**+.0005"
ACCURACY**

Here's Real Precision
Plus
Multiple Tool Efficiency



ENCO TOOL POST TURRETS

Boost lathe production, cut costs, reduce tool switching and re-checking, cut set-up time, with ENCO 12-station tool post turrets! Holds 4 maximum size tools . . . 3 working positions each. Sturdy and rigid for hogging cuts, yet unsurpassed for close-tolerance work.

ON-THE-BALL

RE-INDEXING

Spring loaded balls locked between perfectly milled spherical seats provide consistent re-indexing accuracy. "On the ball" every time!

There's an ENCO turret for every lathe.

Mail coupon for cat. #53 and name of nearest Enco Franchise Dealer.

ENCO Mfg. Co.
4520 W. Fullerton
Chicago 39

ENCO Manufacturing Co.
4520 W. Fullerton,
Chicago 39. Dept. 1128



Please send catalog #53 and full details of ENCO 12-station tool post turrets.

Name

Firm

Address

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new shop equipment . . .



Dumore Cross Arm Bar Table Assembly

ed production operations, has been announced by The Dumore Co., 1302 Seventeenth St., Racine, Wis. This assembly includes bracket, column, cross arm bar, two plate and bolt assemblies, basic mounting brackets, clamp and base. It is an ideal setup for mounting Dumore Series 24, 28 or 26 Automatic Drilling and Tapping Units for versatile fixturing.

For more data circle 103 on Postpaid Card

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GAGING HEAD

The George Scherr Co., 200-MM Lafayette St., New York 12, N. Y., has introduced its Super Compar-It Gaging Head, which features constant measuring pressure and practically frictionless movement of all moving parts. This instrument has graduations of 0.000020 inch and a dial range of plus or minus 0.001 inch. The measuring accuracy over the entire range is plus or minus 0.000010 inch.

It, thus, permits the accurate reading of fractions of 1/10,000 inch directly.

The Super Compar-It Gaging Head is completely jewelled, has a sapphire tipped contact point to minimize wear, absolutely shockproof movement and an extra lift of the plunger to prevent damage to the instrument when measuring grooves and so on.

The dial is of non-glare, matt golden color and the pointer is hair thin to make reading easy and foolproof. Tolerances can be indicated on the outside of the dial window by simple hand movement of two tolerance markers. A very important feature is the zero adjustment of the indicating hand by means of a knob control, conveniently located on the outside of the housing. A cable release lifts and lowers the contact point by remote control, protecting the indicator from the heat of the hand of the operator, unequal pressure and vibration. The small size of the instrument, 2½ by 3¾ inches, makes it ideal for limited working space.

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Scherr Super Compar-It Gaging Head

Leitz New SIMPLEX TOOLMAKERS MICROSCOPE

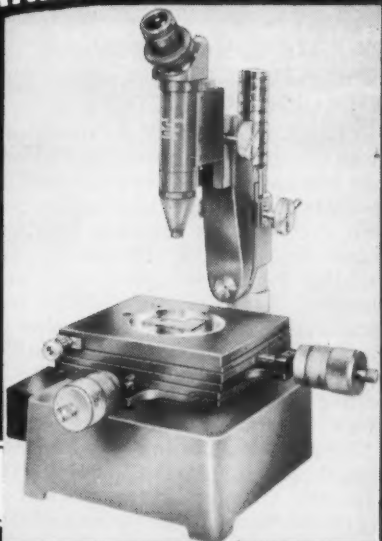
YOU GET

A COMPLETE TOOLMAKER MICROSCOPE
of 2" x 2" range in .0001" at a
basic price of \$1150. Compare
this outstanding value.

Request catalog 81/155

OPTO-METRIC TOOLS, INC.

137 MM VARICK STREET • NEW YORK 13, N.Y.



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Spin Your Rivets Faster

on the NOISELESS LINLEY RIVETER



Cut production costs with the Linley. Quickly produces finely finished rivets. Takes rivets up to $\frac{3}{8}$ " in diameter in iron and cold rolled steel; even larger sizes in brass, aluminum and other soft metals. Send sample parts to be riveted and without obligation we will give you cost and time estimates of doing the job the easy Linley way.

Send Today For Bulletin R
LINLEY BROTHERS CO.

Also Builders of Jig Bore
671 State St. Ext., Bridgeport 1, Conn.

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December, 1958

INVESTIGATE GISHOLT FACTORY-REBUILT MACHINES

NEW MACHINE GUARANTEE

phone or write for quotations
and details

GISHOLT
MACHINE COMPANY

1219 E. Washington Ave., Madison 10, Wis.

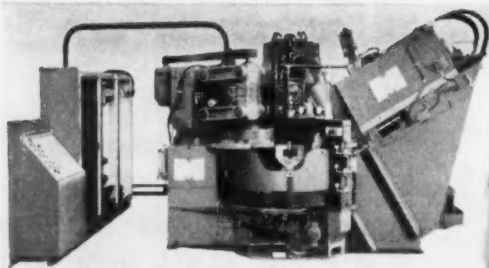
Phone: Alpine 6-9081, Ext. 222
For more data circle 446 on Postpaid Card
modern machine shop 183

new shop equipment . . .

FOUR STATION GRINDER COMBINES FLEXIBILITY WITH HIGH PRODUCTION

A four station grinder, for rough and finish grinding head bearing sections of rock bits and similar parts for mining, quarrying and oil field industries, has been announced by Mattison Machine Works, Rockford, Ill. Despite the fact that it is a high production, automatic machine, this Mattison Grinder has considerable flexibility, being able to handle bit sizes ranging from $3\frac{1}{2}$ to $9\frac{7}{8}$ inches. Adjustable fixtures make it possible to handle a relatively wide range of work.

Three work stations, plus a load and unload station, are included in the Mattison Grinder. At work station No. 2, the top of the pin is ground flat. At station No. 3, the pin diameter is rough ground during the first part of



Mattison Four Station Grinding Machine

the cycle and the pin and the adjacent shoulder are rough ground and the pin is chamfered at the end of the cycle. At station No. 4, the pin diameter and shoulder are finish ground. The entire machine cycle is automatically controlled from the console, which is provided with indicator lights that give a visual record of the work status.

In addition to the automatic cycling of work, precision automatic sizing to



Samples of shearing and notching (also estimates) gladly furnished without obligation.

Look — at these sheared tubular ends — clean, true contoured and close fitting with a minimum of burr and distortion . . . *You can make them fast,* some up to

2000 an hour with Vogel patented tools. Or, if you prefer, we can do your notching, shaping, shearing and perforating . . . Either way

You save on cost!

ARC-FIT® notches up to 720 per hour.

ARC-SNUG prepares pipe ends for snug brazing—up to 500 pieces per hour.

ARC-TWIN® double notches pipe up to 750 pieces per hour.

CUT-OFF shears tubing in two up to 2000 per hour.

VOGEL TOOL & DIE CORPORATION

1823 N. 32nd Ave., Melrose Park, Ill.

For more data circle 447 on Postpaid Card

GRIND: RADIUS—ANGLES

QUICKLY—on your SURFACE GRINDER—EASILY

RADIUS DRESSER \$44.00

Diamond \$8.00



ANGLE DRESSER \$49.00

Diamond \$8.00



ORDER DIRECT
on our 10 day
money back
guarantee

Chatter Resistant, Spring Loaded Spindle

Hardened shaft—bearing adjustable for wear.
Diamond set adjustable perfectly centered.
Easily set adjustable 180° stops.
All surfaces ground true from hole.
CAPACITY—1½" convex to 4" concave.

10" Wheel size for DoALL and NORTON
Grinders—\$49.00. Diamond \$8.00.

14", 20", 24", in stock, low price.

Ball Thrust Bearing.

24 Precision Ground Surfaces.

DIAMOND BLOCK Slides in Ground &
Lapped Housing.

Can't Chatter.

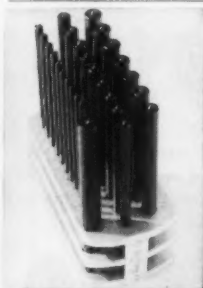
Set Accurately with Protractor or Sine
Bar to 1" of Arc.

Largest Bearing Surfaces of any Angle
Dresser.

The "Mighty Midget" Line

SPERMAN METAL SPECIALTIES • 2199 E. 21st ST. • BROOKLYN 29, N. Y.

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SPELLMACO 'SPOTTERS'

A matched set of transfer punches
for toolmakers, machinists and tool cribs

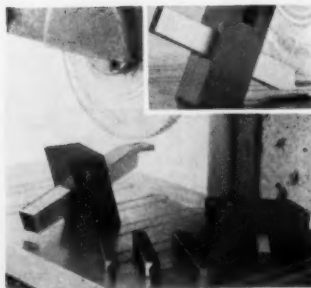
Used for transferring location of threaded, drilled
and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel—Carefully heat treated and tempered for
long life—.0025 undersize to facilitate use—Black oxide finish.

SET #3-17; 28 punches with indexed stand—sizes ⅜" to ½", by
⅜"—plus handy ⅞" size. Length 4⅞". ONLY \$17.90.
Single sizes available

R. L. SPELLMAN CO. • URBANA, OHIO

For more data circle 449 on Postpaid Card



SPELLMACO TOOL GRINDING FIXTURE

A quick, easy, accurate way to grind
or sharpen a cutting tool.

This fixture can be used for all size bits ⅜" or smaller.
No complicated settings to make. Precision ground.
Heat treated for long life. Only \$9.95 each.

R. L. SPELLMAN CO. • URBANA, OHIO

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new shop equipment . . .

compensate for wheel wear is also built into the machine.

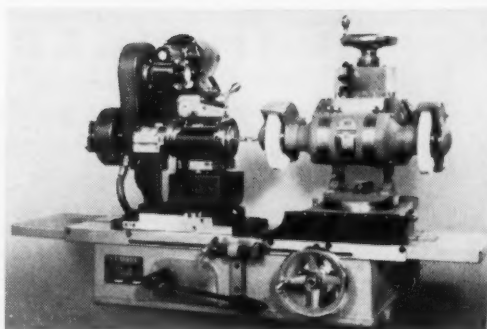
Following each operation, pieces are automatically gaged and the gaging head signals the machine to feed in as required, insuring that finished work is always within limits.

For more data circle 105 on Postpaid Card

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AIR POWERED COLLET CLOSER FOR GRINDING FIXTURE

A non-rotating air powered collet closer for the R-O Universal Form Relieving Fixture has been announced by Royal Oak Tool and Machine Co., 29800 Stephenson Highway, Royal Oak, Mich. This device speeds up the



R-O Universal Form Relieving Fixture

job of interchanging tools and adapts the equipment to high speed production sharpening.

This collet closer operates on shop air (60 p.s.i.) and is actuated by means of a double acting foot operated valve. The chuck and drawbar assem-

AIRETOOL Pneumatic Tools do more work per dollar

Airetool pneumatic tools operate at the same air pressure as others. Your power costs are the same. Yet Airetool equipment consistently achieves higher production than other tools per man hour. There is a good reason. Airetool air motors get more work from a pound of air. Your operators get more work from their Airetool pneumatic tools. Why not write today for complete information about these and other Airetool high-production tools? Ask for Catalog #63.



MIDGET DIE GRINDERS

Save time on precision, intricate grinding jobs. Use with carbide burs and abrasive wheels. 38,000 to 60,000 rpm.



VERTICAL GRINDERS

Step up production on rough grinding, snagging, depressed center wheel work.



HORIZONTAL GRINDERS

Fast for fine finishing, grinding, snagging. 4" to 8" wheels.



PNEUMATIC DRILLS

Handle drilling operations in a hurry. 5/32, 3/16, 1/4, 1/2, 5/8, 3/4" capacities.

CANADIAN PLANT: 37 Spalding Drive, Bramford, Ontario

EUROPEAN PLANT: Vlaardingen, The Netherlands

Airetool offices and representatives in principal cities of U.S.A., Canada, Mexico, Puerto Rico, South America, Hawaii, England, Italy, Europe, Japan

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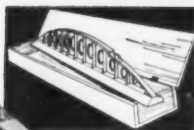
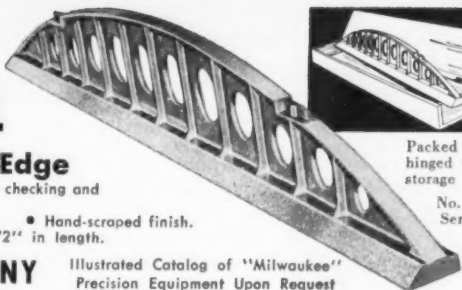
Check & Mark Machine Tool Beds With This

BEVEL EDGE

DOVETAIL

Precision Straight Edge

- All-around useful in tool room for checking and marking beds and ways.
- Furnished in any desired angle.
- Available in sizes from 18" to 72" in length.
- Hand-scraped finish.



Packed in
hinged wood
storage case.

No. 200
Series

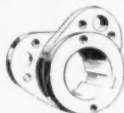
J. C. BUSCH COMPANY

Illustrated Catalog of "Milwaukee"
Precision Equipment Upon Request

126 E. Pittsburgh Ave., Milwaukee 4, Wis.

Engineers & Machinists Since 1907

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CAMS like these . . . and many others . . . are produced by
ROWBOTTOM

Types include: box, barrel, side, index, face as well as hardened and ground with bore and shapes exactly to your specifications. Also rotary profiling. Outline your needs.

THE ROWBOTTOM MACHINE CO. - - - - - Waterbury, Connecticut

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You'll be sure of MAXIMUM ACCURACY



with ROOFE Standard Type LIVE CENTERS

ROOFE Live Centers are made of the finest alloy steel. They are acclaimed by users everywhere not only because they give the highest degree of accuracy, but because they increase production and lower costs. ROOFE Standard Type LIVE CENTERS are available in Morse Taper, Brown & Sharpe, Jarno, straight or special shanks—to your specifications. Write for catalog.

Reliable distributors wanted.

HOUSTON GRINDING & MFG. CO., Inc.

P. O. BOX 7461 • HOUSTON 8, TEXAS

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new shop equipment . . .

bly mount in the standard motor driven fixture without alteration. The drawbar rotates in the closer on a precision needle bearing and thrust is taken on two shielded ball thrust bearings.

For more data circle 106 on Postpaid Card

HOW TO . . . Bend Thin-Walled Tubing, faster and better . . . with



CERRO* ALLOYS

For bending thin-walled tubing, CERROBEND®... a low-temperature-melting bismuth alloy (CERRO ALLOY)... is the ideal filler. CERROBEND is poured into an inclined tube immersed in hot water, then the loaded tube is removed and rapidly quenched in cold water. Upon assuming shop temperature, the loaded quenched tube can be bent over a forming block or in a regular bending machine. The CERROBEND ALLOY melts out easily in boiling water.



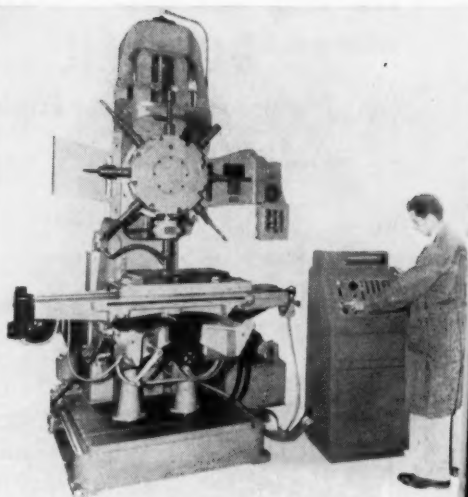
Send for Bulletin H-3, and the CERRO ALLOY "HOW TO" applications booklet.

CERRO DE PASCO SALES CORPORATION

304 PARK AVENUE, NEW YORK 22, N. Y.

*T.M. Cerro de Pasco Corporation

For more data circle 455 on Postpaid Card



Burgmaster Model 3BH-T Tape Controlled Turret Drilling, Tapping and Boring Machine

TURRET DRILLING, TAPPING AND BORING MACHINE IS TAPE CONTROLLED

Automatic numerical tape controls have been applied to the large Burgmaster Model 3BH-T Turret Drills, which have eight spindles, as well as to the 2BH-T machines, which have six spindles, according to Burg Tool Manufacturing Co., Inc., Department 1, 15001 South Figueroa St., Gardena, Calif. This machine utilizes an Elec-

"IMP" MULES... real work and time savers



You save time, money and machines using "IMP" Mules. Perfect for drilling round or square stock. Priced at only \$8.95 to \$12.60.

Write today for "IMP" Mule bulletin.



ILLINOIS METAL PRODUCTS

429 SUPERIOR ST. CHICAGO 10, ILLINOIS

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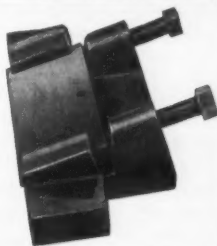
QUICK SURE GRIP...

FOR ANY WORK ON ANY MACHINE TABLE

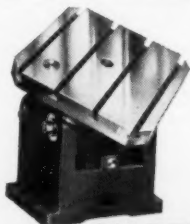
HART DIVIDED MACHINE VISE JAWS

Write for
circular

WALTER W. FIELD & SON, INC.
39-51 HAYWARD STREET, CAMBRIDGE 42, MASS.



For more data circle 457 on Postpaid Card



SAVE 50% of positioning time

With one set-up on a Cincinnati Gilbert universal table, you can drill at any angle up to 90° on 5 sides of a cube. Provides maximum support of work piece, assures rigidity and accuracy. Table sizes: 22" and 27" square, 22" high. For complete details and specs, ask for Bulletin 850.

THE CINCINNATI **GILBERT** MACHINE TOOL COMPANY • CINCINNATI 23, OHIO

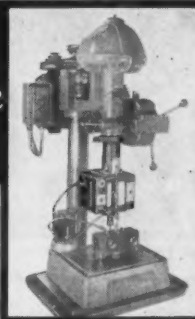
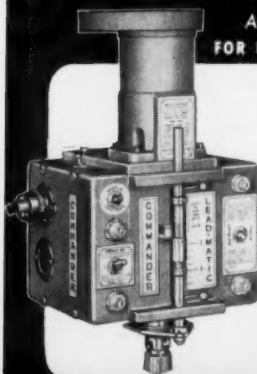
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Commander LEAD-MATIC Tapper

Automatic Tapper with Lead Screw
FOR HIGH PRODUCTION PRECISION TAPPING

- Precision Ground Lead Screws Assure Finest Threads
- Electrically Controlled Cycle or Jog Tapping Action
- Hand, Foot or Fixture Switch Control
- Easily Adapted to Any Drill Press
- Range #0 to 3/4"

Built for high production tapping . . . precision or otherwise, the Commander Lead-Matic Tapper makes any drill press a precision tapping unit, even with inexperienced operators. Electric control of Cycle or Jog tapping action provides versatility to handle any job . . . automatic tap reversal eliminates drill press motor reversing and speeds tapping. Compact, ruggedly built, easy to operate, the Commander Lead-Matic Tapper will cut your tapping costs and reduce rejects to a minimum.



Write for illustrated circular and
name of nearest Distributor.

Commander MFG. CO.

4224 W. KINZIE ST. • CHICAGO
PRODUCT OF COMMANDER... BUILDER OF PRODUCTION TOOLS

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new shop equipment . . .

tro-point Control System or a General Electric tape control unit, modified for Burgmaster Turret Drilling Machines.

The machine controls are flexible, permitting four modes of operation as follows. (1) Manual control from the

Burgmaster control station—used for setting up and individual operations, if desired. Manual control from the console cabinet is also permitted. A control switch disconnects the tape reader, but permits the manual use of the motor drive to position the table, which registers numerically on the display. (2) Semi-automatic control employs the tape reader, which is under full operator control, for checking out a new tape. (3) Automatic operation, where all functions of the machine are directed by the Tape Control System, for regular production. (4) Standard Burgmaster Automatic Hydraulic Controls with the console shut down.

For more data circle 107 on Postpaid Card

LOWEST PRICES Diamond Wheel Dressers

Guaranteed to be full, individual stones, mounted in 7/16 x 6" cold rolled shanks

Carat	Price
1/4—	\$ 2.25
1/2—	4.00
3/4—	6.00
1 —	8.25
1 1/2—	12.00
2 —	16.00



★ These diamonds can be set in any shank to your specification for \$1.00 each extra.

★ Prompt resetting service

Allstate Diamond Products, Inc.

Manufacturers of a complete line of diamond tools and wheels

245 W. 27th St., Dept. F, New York 1, N. Y.

CHickering 4-7725

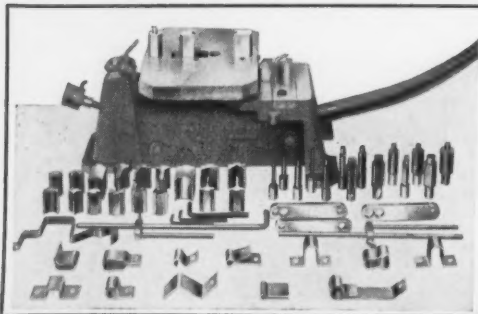
★ Dealers' inquiries invited

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★ modern machine shop ★

CABINET BENCHES WITH VISIBLE EQUIPMENT STORAGE

The Handicabinet bench series has been announced by Bay Products, Inc., 3015 North Sixteenth St., Philadelphia 32, Pa. The storage cabinet is placed neither below the bench nor on the bench, but is carried across, above the surface, leaving a full foot of working room beneath. There are no supports or obstructions of any kind beneath the cabinet. Thus, the full 30 inch working depth of the bench is clear and available for use.



Multiform BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, and Steel Rule Dies for Metal Blanking.

**AIR OR HAND MODELS FOR UP TO
1/4" to 4" MATERIAL**

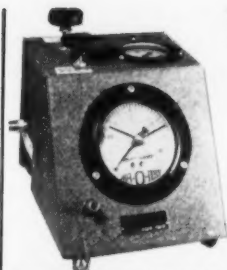
Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6-M

Kalamazoo, Mich.

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\$98

'AIR-O-TEST'

Air Comparator Gage

SIMPLE — INEXPENSIVE — ACCURATE

FREE information sheets on how to make your plugs for checking holes and other testing set-ups.

FOR EVERY KIND OF CHECKING IN THE SHOP.

Squareness — Outside Diameter — Height — Parallelism — Concentricity
Machine Set-ups — Boring — Grinding

ITS USE IS ONLY LIMITED BY YOUR IMAGINATION

Sold on 10 day, Money Back Guarantee.

THE "MIGHTY MIDGET" LINE

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DYKEM

STEEL BLUE

Stops Losses

making Dies and
Templates

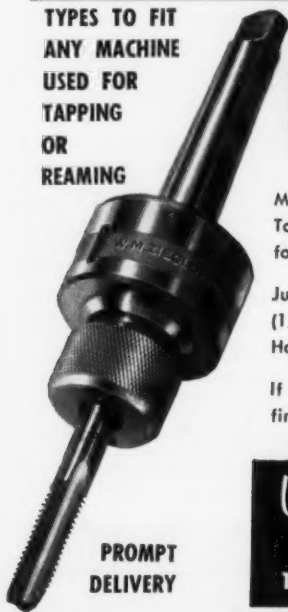
Popular package
8-oz. can fitted
with Bakelite cap
holding soft-hair
brush for applying right
at bench; metal surface
ready for layout in a few min-
utes. The dark blue background
makes the scribed lines show up in
sharp relief, prevents metal glare.
Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.

With DYKEM Steel Blue Without DYKEM Steel Blue

For more data circle 463 on Postpaid Card

**TYPES TO FIT
ANY MACHINE
USED FOR
TAPPING
OR
REAMING**



**PROMPT
DELIVERY**

Drive SET-UP COSTS Down!

Making set-ups for tapping and reaming can be done with Ziegler Tool Holders at a lower labor cost than with ordinary tool holders for the simple reason that it takes less time with a Ziegler.

Just align the work to within 1/32" of accuracy on the radius (1/16" on the diameter) and the job is done—because the Ziegler Holder automatically compensates for the inaccuracy.

If you have never used a Ziegler, a big surprise awaits you the first time you give it a trial.

W.M. ZIEGLER TOOL CO.

roller drive floating tool-holders

13566 Auburn • Detroit 23, Michigan

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new shop equipment . . .

The cabinet itself may be arranged to suit the job requirement. Intermediate shelves are adjustable vertically on 1 inch centers, and more shelves may be added. Partitions between shelves may be added and these are adjustable horizontally on 2 inch cen-



MARK OF
QUALITY

STANDARD

MACHINE KEYS



We are able to furnish the following types of finished machine keys of any size and taper: Gib head taper keys, Plain taper keys, Straight keys, Round end feather keys, and Tilt keys. We can supply you quickly with the quantities you need at the specifications you require.

Send for new catalog giving complete information on Woodruff keys, taper pins, machine keys and machine racks.

STANDARD STEEL SPECIALTY CO.
BEAVER FALLS • PENNSYLVANIA
Plants: Beaver Falls, Pa.; Hammond, Ind.

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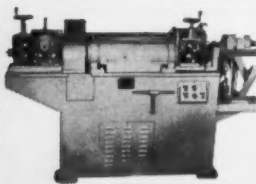
The Bay Basic Handicabinet Bench

ters. The cabinet is 12 inches deep and will hold up to 1,500 pounds.

For smaller delicate equipment, a standard model utilizes drawer storage. Drawers are of varying sizes and have adjustable cross dividers with label holders. The drawers are provided with stops so that they cannot be pulled out and dropped accidentally, although they can be removed easily, if desired.

An interesting locking door arrangement is available which closes the entire cabinet. The doors are double jointed; that is, hinged in two places. This makes it possible to fold them up on top of the cabinet, leaving the

If you use wire
up to 3/8" . . .
**this new
SHUSTER
is for you!**



Send for complete details to

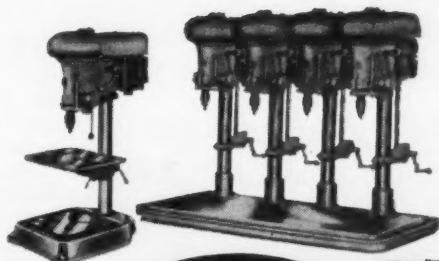
METTLER MACHINE TOOL, INC.

157 ADELIN ST., NEW HAVEN, CONN.

For more data circle 466 on Postpaid Card

Save Time, Money
and Labor with

DURO DRILL PRESSES



68 Models

get the right drill press
for the right job at
the right price

Duro Drill Presses are precision units, offering extra capacity, extra features at no extra cost! It is the only line that permits "custom selection" from the largest array of models in the power tool field. The Duro Line includes single and multiple units, in 15 1/2" and 18" sizes, with or without production tables and bases, with optional foot feeds, in bench or floor models. Each unit has sealed-for-life ball bearings, precision bored bearing seats, ground alloy spindles, vibration free head castings, sturdy cast hinged belt and pulley guards; adjustable feed tension, plus many others.

Write for FREE Power Tool Catalog

DURO Metal Products Co.

2669 N. Kildare Avenue, Chicago, Illinois



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Lifts and
turns in
one motion.



**DIXON ONE-MAN
COIL GRAB**
CUTS TIME
AND COSTS WITH
ONE-MOTION
REEL LOADING

Saves labor and speeds coil handling. One man can lift, turn, and load coil with a single, easy motion. Positive grip and support eliminate coil damage, assure operator safety. Forged steel wedge separates coils easily. Standard sizes up to 15,000 lb. capacity available from stock.

WRITE FOR COMPLETE DATA—New bulletins illustrate standard models and show how to handle all coil sizes safely, rapidly, without damage. Write for them today.



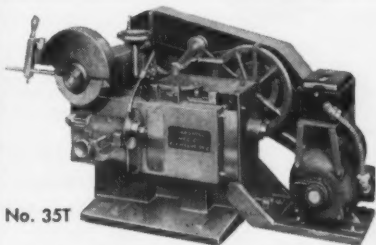
DIXON AUTOMATIC TOOL, Inc.

2314 - 23rd AVENUE
ROCKFORD, ILLINOIS

Equipment for Automatic Parts Handling and Assembly

For more data circle 468 on Postpaid Card

December, 1958



No. 35T

SHARPENS SAWS
Automatically, in Gangs

Just think of it! 100 26 gauge saws sharpened at one time. Takes saws up to 5 1/2" dia. and 1 3/4" thick. Saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR 35T

The WARDWELL MFG. CO.

3803 RIDGE RD.

CLEVELAND, O.

For more data circle 469 on Postpaid Card

modern machine shop 193

new shop equipment . . .

cabinet fully open and accessible. When closed, doors fit into a recess frame which makes them almost impossible to force.

All of these benches are available in a choice of two widths, 5 and 6 foot, and in a choice of two kinds of

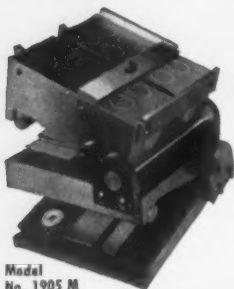
tops, masonite surfaced wood block core or solid maple. All other parts are steel, finished in forest green baked enamel applied over iron phosphate rust inhibitor.

For more data circle 108 on Postpaid Card

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MAGNETIC SINE PLATES

COMPOUND AND SINGLE ANGLE



Model
No. 1905 M

New Dual Field
permanent
magnetic chucks
with extra
holding power.
Positive lock on
each axis.

The new Dual Field permanent magnetic chucks, with a center T slot, allow either side to be magnetized independently. All models are accurate to .0002" in dimensions and parallelism. A .2000" recess is provided for small angles.



Write for catalogue and prices on full
line of Bald Eagle Sine Bars and Plates.
For quality—Specify Bald Eagle

Bald Eagle Corporation

(Formerly Bald Eagle Tool Co.)

356 Cedar Street • St. Paul 1, Minn.

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6 INCH SURFACE GRINDER

Norton Co., Worcester 6, Mass., has announced the 6 by 18 inch type S-3 Hydraulic Surface Grinder, the most significant feature of which is a substantial increase in table speed which is said to reduce grinding time as much as 50 percent over similar machines. The maximum table traverse speed of 125 f.p.m. is believed to be the fastest available on any surface grinder of this capacity.

In addition to reducing grinding time, the high maximum table traverse speed reduces burn, checking and cracking of the work. This is particularly true when grinding heat sensitive steels.

Another feature is the machine's capacity for grinding a workpiece as high as 15 inches above the work table with a standard 8 inch diameter grinding wheel.

The Type S-3 Surface Grinder has several improved design features. The two hand scraped flat ways of the base are long and wide, resulting in the minimum bearing pressure per square

*You Need an Extra Hand Now
to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS



IN 11 SIZES—No. 6 to 1"
N.C. in all S.A.E. sizes.

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

HEIMANN MFG., CO. • URBANA, OHIO

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**CUT
TOOL
COSTS**

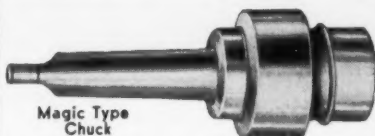
broken tools
made like new again
with **NU-TANGS**

Twisted or broken tangs replaced at low costs on any tool with a Morse Taper (sizes 1 to 4). Hundreds of leading industries save money on drills, reamers, countersinks, cutters, drivers, the NU-TANG way. Prompt delivery. Send for prices—or send tools for repair. All work guaranteed.

NO WELDING! NO SLEEVES!
NO SHORTENING! NO DISTORTION!
GUARANTEED *We return them like this!*
STRONG AS NEW!

Send them to us like this! **NU-TANGS INC.** 1339 Bates Avenue Cincinnati 25, Ohio

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Magic Type
Chuck

THE COLLIS MAGIC-TYPE CHUCKS

Reduce production costs with Collis Magic Chucks. Now tools can be changed without stopping or slowing down the spindle. Boring, counter boring, drilling, reaming, tapping, etc., can be performed practically continuously.

Let our 40 years of manufacturing experience help your customers select the proper equipment for the job.

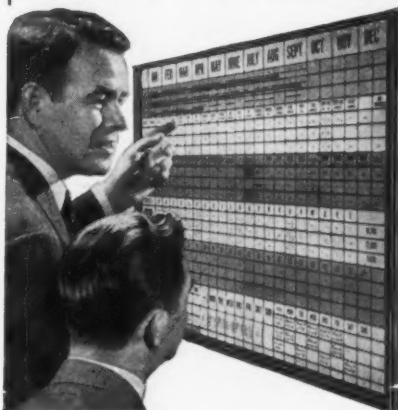
"Call Collis For Service"

THE COLLIS CO.

Dept. A, Clinton, Iowa

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December, 1958

You Get Things Done With Boardmaster Visual Control



- ☆ Gives Graphic Picture of Your Operations — Spotlighted by Color
- ☆ Facts at a glance—Saves Time, Saves Money, Prevents Errors
- ☆ Simple to operate — Type or Write on Cards, Snap in Grooves
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- ☆ Made of Metal. Compact and Attractive. Over 300,000 in use.

Complete price **\$49.50** Including cards

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24-PAGE BOOKLET NO. MS-40
Without Obligation

Write for Your Copy Today

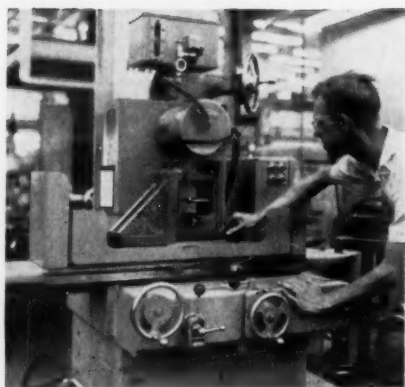
GRAPHIC SYSTEMS

55 West 42nd Street • New York 36, N. Y.

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modern machine shop 195

new shop equipment . . .

inch, hence long wear. The straightest possible cross tracking of the saddle is assured by a unique guide rail and preloaded ball bearing roller construction. This feature is particularly important in grinding square shoulders. Long vertical ways provide rigid sup-



Norton 6 by 18 inch Hydraulic Surface Grinder with "coolant thru the wheel" being set up for reconditioning a jig in the toolroom

Over 85% of the torque wrenches used in industry are

STURTEVANT

TORQUE WRENCHES

Read by Sight, Sound or Feel

- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch grams
...inch ounces
...inch pounds
...foot pounds

Every manufacturer, design and production men should have this valuable data. Sent upon request.

PA **STURTEVANT CO.**
ADDISON [QUALITY] ILLINOIS

For more data circle 475 on Postpaid Card

port, even at the maximum 15 inch height. The box type base provides perpendicular support for the wide saddle ways. The wide saddle supports the sliding table with minimum overhang, in turn, providing maximum support for the work being ground.

For more data circle 109 on Postpaid Card

★ modern machine shop ★

SUMP CLEANER ELIMINATES PUMP REPLACEMENT

Coolant Equipment Corp., Verona, Wis., recently added the Model AX-450 Portable Machine Tool Sump

HARGRAVE

Individually
Tested

TOOLS

CLAMPS • CHISELS • PUNCHES

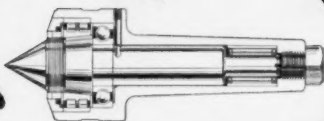
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• Local Distributor

THE CINCINNATI TOOL CO.
1947 Waverly Ave., Cincinnati 12, Ohio

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NIELSEN Heavy Duty Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

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M on live centers

NIELSEN, INC. LAWTON, MICHIGAN

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Universal "FULL-FLO" COOLANT NOZZLES with AERATOR

Ask for IPB-Sec. 2A Bulletin



Quality... ALL METAL FLEXIBLE HOSE PRODUCTS

UNIVERSAL METAL HOSE CO.

7113 South Kedzie Avenue, Chicago 23, Illinois

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MINIATURE DRILL BUSHINGS

Hole Sizes—No. 80 to 3/32"

O.D. 3/32" to 13/64"

Lengths 1/4" to 3"

.0002 Tolerance on I.D.

O.D., and Concentricity

Specials to your specifications

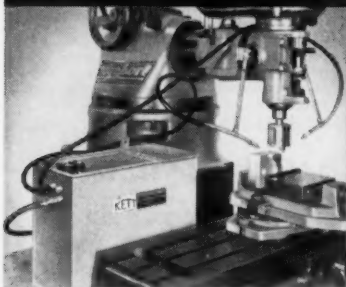
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PREBCO BUSHING CO.

14702 East Arrow Hwy., Baldwin Park, Cal.

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WHATEVER YOUR DRY MACHINING PROCESS— Economical KETT "Mystic-Lube" Mist Coolant Generator



GIVES YOU...

- Faster Operating Speeds
- Longer Tool Life
- Deeper Cuts
- Better Finishes
- Lower Costs
- Flexibility
- Portability
- Dependability

Mist dissipates in the air—cools by refrigeration principle. No special coolants, no moving parts—operates off any air line. Compact, all-in-one unit, one and four gallon size, has features non-available in many higher priced models. Quality designed for quick transfer, ease of maintenance.

WRITE FOR LITERATURE AND PRICE LIST

KETT

THE KETT TOOL COMPANY

5048 Madison Rd. Cincinnati 27, Ohio

For more data circle 480 on Postpaid Card

new shop equipment . . .

Cleaner to its air powered RedTop Series. It is available in 100, 150 and 200 gallon tank sizes. The Model AX-450 super high suction removes water soluble coolant, oil, solvent, sludge and chips from hard to get at machine tool sumps. Hidden or inaccessible corners pose no problem. The air operated unit has no moving parts to



Model AX-450 Machine Tool Sump Cleaner

TOOL AND DIE DESIGN SHOP MATH, MECH. DRAWING



Important courses now available by correspondence. Shop Math and Mechanical Drawing give you basic education you need for industrial work—both are complete, thorough, 100-hour courses. Acme's Tool and Die Design training is recognized as tops for

this important, high-pay field! Here is a career opportunity for any qualified man willing to apply himself! Write today for catalog to ACME INST. OF TECHNOLOGY, Dept. 107, 50 S. Jefferson, Dayton 2, Ohio.

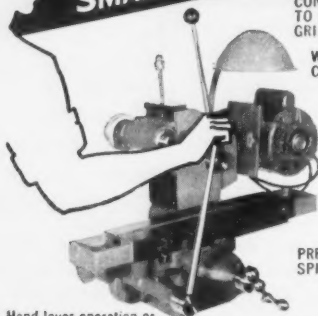
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HIGH PRODUCTION LOW COST

PRECISION SMALL PART MILLING

CONVERTS
TO SURFACE
GRINDING

WIDE
CAPACITY



PRECISION
SPINDLE

Hand lever operation or
calibrated feed screw
Vertical mill available

Price complete as above
\$285.00
(less motor)



Manufactured by
NORTHERN ILLINOIS MACHINISTS
Crystal Lake Rd. • McHenry, Ill.

For more data circle 482 on Postpaid Card

198 modern machine shop

wear or require maintenance. Abrasive waste cannot cause damage.

Material from the sump is drawn through a cloth strainer and the cleaned liquid passes into the tank body. A 70 pound capacity sludge filter unit is removable for simple cleaning or when straining is unnecessary. Suction stops automatically when the tank is filled. Simple selector valve setting provides pressure discharge of tank contents. Gravity discharge is through a bottom drain or an 8 by 10 inch cleanout door.

Best operation requires $\frac{1}{2}$ inch air service and 75 to 120 p.s.i. line pressure. Pumping rate is 20 to 50 g.p.m. This unit can be towed behind tractors. For more data circle 110 on Postpaid Card

GRIND THE

Eastern Centerless Way

WE SPECIALIZE

20 CENTERLESS GRINDERS

ESTABLISHED 1939

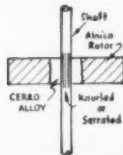
Eastern Centerless Grinding Co.

470 Tolland Street East Hartford 8, Conn.

For more data circle 483 on Postpaid Card

December, 1958

HOW TO . . . Anchor Shafts in Alnico Rotors, quickly and accurately . . . with **CERRO* ALLOYS**



Permanent magnet alternator rotors are securely "keyed" to shafts with bismuth-tin alloys (CERRO ALLOYS). Low-temperature-melting CERROTRU® or CERROMATRIX® is poured into the space between shaft and oversized hole cast in rotor. An alternate method is to completely fill the cored hole with CERRO ALLOY, then drill for a press fit. The aftergrowth of the expanding, solidifying CERRO ALLOY develops a positive holding pressure . . . firmly anchoring the splined or serrated shaft and rotor.



Send for Bulletin A-1, and the CERRO ALLOY "HOW TO" applications booklet.

CERRO DE PASCO SALES CORPORATION

304 PARK AVENUE, NEW YORK 22, N. Y.

*T.M. Cerro de Pasco Corporation.

For more data circle 484 on Postpaid Card

CAM MILLING JIG BORING



A SPECIALIZED CAM
MILLING SERVICE,
JIG BORING
... SPOT WELDING
... CONTRACT PRODUCTION
EXPERIMENTAL DEVELOPMENT

SEND FOR NEW CATALOG NO 33-C

EISLER ENGINEERING CO., INC.

734 S. 13TH ST., NEWARK 3, N. J.

For more data circle 485 on Postpaid Card

NEW FLUSH PIN AMPLIFIER



OFFERS 5 to 1
AMPLIFICATION

- No dial indicator needed • No master required
- Extremely rugged • Speeds up inspection • .001 to .010 tolerance range. WRITE FOR DETAILS.

HOLMES GAGE & DEVELOPMENT CORP.
Columbus 3, Ohio

For more data circle 486 on Postpaid Card

save on cost!



SPEEDLAP

With SPEEDLAP'S rapid stock removal and micro-inch accuracy you can size and finish parts like these minutes faster . . . handle tungsten carbides, ceramics, tough alloys or plastics . . . obtain a 1 RMS finish; flatness and parallelism to 2 millionths of an inch . . . and do it cheaper with unskilled labor. No fixtures are required. There is nothing to dress or resharpen. No cutters or wheels to change.

Ask for cost and production estimates based on samples of your work. No obligation. (Job lapping service available if desired.)

ABRADING SYSTEMS COMPANY
8020 NORTH MONTICELLO AVENUE • SKOKIE, ILLINOIS

For more data circle 487 on Postpaid Card

DO THESE JOBS EASIER and FASTER with



Water cooled lap base dissipates operational heat to avoid distortion.

Non-chargeable alloy lap plate assures rapid stock removal.

Full wear control maintains constant lap flatness.

Adjustable parts-handling stage loads and unloads parts quickly.

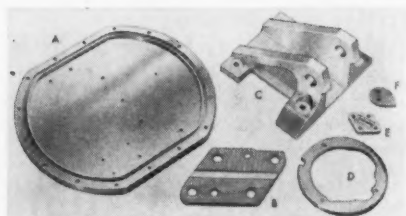
Full pressure air system maintains maximum lapping pressure and raises pressure plates at end of lapping cycle.

new shop equipment . . .

IMPROVED DUPLICATOR HAS WIDE USE

The Regent R-200 Duplicator, product of the J. M. Kalins and Co., 1579 Railroad Ave., Bridgeport, Conn., has been improved to permit mounting on any vertical miller in use today. It can be installed by tightening only four bolts and is a completely self-contained unit. It combines extra sensitivity of true fluid motion with extreme rigidity which is provided by its basecasting-mounted follower arm.

The parts shown in the illustration demonstrate such precision duplicating and profiling operations as (A) O ring groove milled on instrument cover, approximately 6 inches long; (B) outside contour milling on aircraft part; (C) inside contour milling on aircraft part; (D) inside contour



These are typical parts produced with the J. M. Kalins Improved R-200 Duplicator

milling and outside beveling on internal cam; (E) periphery and inside recess on waveguide component; and (F) periphery of precision cam for computer.

The Regent Duplicator is also available in the R-300 Model which provides fast, accurate two and three dimensional duplicating and profiling of complex machined parts. All models are equipped with a rugged and adjustable built in friction brake to

Combined Center Drills & Countersink 60°. Super HSS. Top Quality



No.	Diameter		Length		Price Each	
	Drill	Body	Drill	Overall	Right Hand	Left Hand
00	0.020"	1/8"	3/8"	1 1/4"	\$1.35	\$1.70
01	0.025"	1/8"	3/8"	1 1/4"	1.10	1.50
0	1/32"	1/8"	3/8"	1 1/2"	.95	1.30
1	3/64"	1/8"	3/8"	1 3/8"	.80	1.00

Delivery from stock. No. 2 & 3 also av.

H. KAPP ENGINEERS
110-07 66th Rd. • Forest Hills, L.I., N. Y.

For more data circle 488 on Postpaid Card

C A M S

Complete Facilities For
**CAM MILLING and
CAM GRINDING**
To Your Specifications



**COLUMBIA
CAM CO.**

26-07 JACKSON AVE. LONG ISLAND CITY, N. Y.

For more data circle 489 on Postpaid Card

200 modern machine shop

D O R M A N AUTOMATIC REVERSE TAPPERS



• Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.
• WIDE RANGE TAP CAPACITY.

No. 1A FRICTION DRIVE TAPPER — capacity No. 2-56 to 3/8" in Steel — 1/4" in Aluminum.

No. 2B POSITIVE TAPPER — capacity 3/8" to 7/8" in Steel.

No. 3A POSITIVE TAPPER — capacity 1/2" to 1 1/4" in Steel — 1/2" to 3/4" Pipe Taps.

No. 4A TAPPER — capacity 3/4" to 2" in Steel including Pipe Taps.

Priced from
\$62.00

Write for
Bulletin

**IMMEDIATE
DELIVERY**

• **PRODUCTION THREADERS** with Round Split . . . Button . . . Acorn Dies.

THRIFTMASTER PRODUCTS CORPORATION

Division of Thomson Industries, Inc.

1034 N. PLUM STREET, LANCASTER, PA.

STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILL HEADS

For more data circle 490 on Postpaid Card

December, 1958

assure exact control of any job within the machine's rated limit. Capacity is 6 by 6 inches in a 1:1 ratio with the master.

For more data circle 111 on Postpaid Card

★ modern machine shop ★

HACK AND BAND SAW BLADES AND GROUND FLAT STOCK

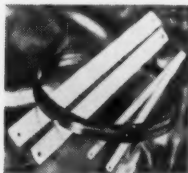
Nicholson File Co., Providence, R. I., recently announced a complete line of hack saw and band saw blades and ground flat stock.

Hand hack saw blades are made in both high speed steel and standard steel.

Included in the company's line of hard edge flexible back band saw blades are the Nicholson Magi-cut and Nicholson Hook Tooth and Skip Tooth.

Precision ground flat stock is available from this company in more than 1,000 various sizes.

For more data circle 112 on Postpaid Card



Nicholson Hack and Band Saw Blades

COMBINATION POWER DRILLING AND CHECKING FIXTURE

M and M Tool and Manufacturing Co., 1124 East Third St., Dayton 2, Ohio, has announced the M-M Check, which is not only a checking fixture, but can be used as a grinding fixture for grinding any combination of slots, squares, hexagon and so on. M-M Check makes an excellent accessory for jig grinders, jig borers and for boring or drilling holes in plates on

CUT COSTS SAVE TIME IMPROVE QUALITY

use **CRATEX**
Rubberized Abrasives

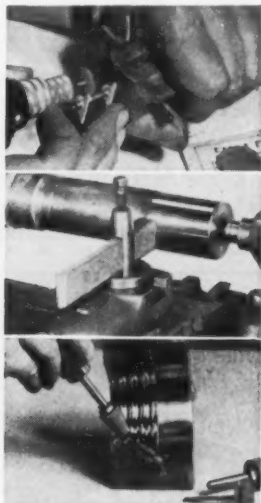
for MICRO-DEBURRING,
SMOOTHING, CLEANING,
POLISHING on HARD or SOFT
METALS and other materials

4 grit textures

Course — C • Medium — M
Fine — F • Extra Fine — XF

WHEELS • POINTS • BLOCKS
STICKS • CONES for power

or manual application and dimensional control. **CRATEX** is sold through leading industrial supply distributors.



For actual field application reports on how **CRATEX** "cushioned action" can cut costs in your own operations, send this coupon.

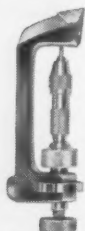
CRATEX MANUFACTURING COMPANY

1600 ROLLINS ROAD, BURLINGAME, CALIFORNIA

● Please send Catalog and **CRATEX** Application data for:

Name _____	<input type="checkbox"/> Stainless Steel
Title _____	<input type="checkbox"/> Aluminum
Company _____	<input type="checkbox"/> Brass & Bronze
Street _____	<input type="checkbox"/> Cast Iron
City _____	<input type="checkbox"/> Heat-treated Steel
Zone _____	<input type="checkbox"/> Special Alloys
State _____	

For more data circle 491 on Postpaid Card



TRUE POINT DRILL SHARPENER

for Drills 41 - 60 and
61 - 80 R.H. & L.H.

A properly sharpened drill cuts
faster — more accurately and is
less likely to break.

Write for circular and
full details.

UP-TO-DATE TOOL CO.

P. O. Box 99, Station A, Worcester 8, Mass.

For more data circle 492 on Postpaid Card

CAMS

MADE TO YOUR SPECIFICATIONS

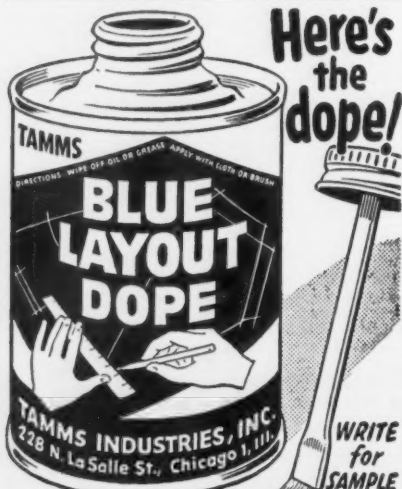
—Except Screw Machine Cams—

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 493 on Postpaid Card

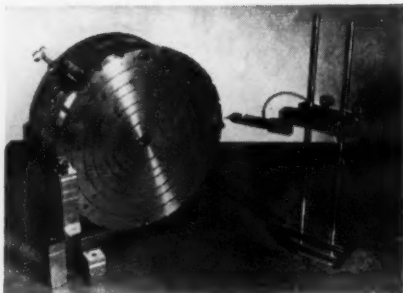


**DRYS FAST-RESISTS OIL
WON'T CHIP, CRACK OR FLAKE OFF!**

For more data circle 494 on Postpaid Card

202 modern machine shop

new shop equipment . . .



M-M Power Drilling and Checking Fixture

bolt circles 1, 2, 3, 4, 6, 8, 12 and 24
combinations. It can also be used for
grinding radii and contours.

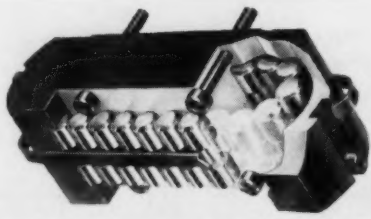
This device is being offered for
applications where precision drilling
is being done. This useful unit can be
motor driven or can be purchased
without the motor for hand operation.
It is equipped with tooling bolts for
checking any angles.

For more data circle 113 on Postpaid Card

★ modern machine shop ★

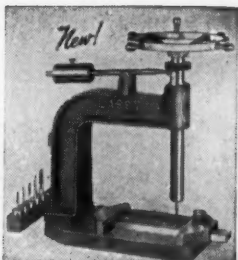
BEARING FEATURES IMPROVED MOUNTING METHOD

Tycho Manufacturing Co., 561 Hill-
grove Ave., La Grange, Ill., has an-
nounced a new bearing development—



Tychoway Bearing has new mounting method

December, 1958



LASSY

Supersensitive Hand Tapper

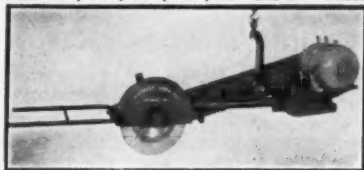
New exclusive features and top quality make Lassy Tappers outstandingly the finest available.

Write for New Illustrated catalog on Time Saving Devices.

LASSY TOOL COMPANY, Plainville, Conn.
For more data circle 495 on Postpaid Card

MUMMERT-DIXON SWING FRAME GRINDERS

Sizes 12", 14", 16", 18", 20" and 24" wheels



Ask for Descriptive Circular
MUMMERT-DIXON CO.
120 Philadelphia St. * Hanover, Pa.

For more data circle 496 on Postpaid Card

Unexcelled in Quality
and Performance since 1903!

HIGH SPEED FLAT TWISTED & ROLLED SECTION

DRILLS

HI-DUTY Flat-Twisted and Rolled Section Drills are produced by forging and hot twisting bars of high speed steel. This method improves the structure by preserving the grain of the steel. Sizes range from 1/8" to 3/4" and larger. Milled type drills are also available—from 1/4" to 1/2" diameter. Hi-Duty means long lasting economical service!

SPECIAL DRILLS

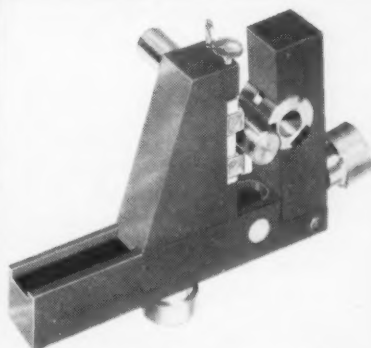
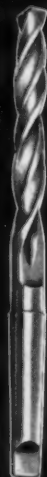
We manufacture a large variety of special types of high speed drills—special diameters; lengths; step drills. FAST DELIVERY. We can make immediate shipment from stock on many special drills! Contact your industrial Supplier or write today for Catalog and Price List. Inquiries from representatives and distributors invited.

HI-DUTY DRILL WORKS

Division of Hi-Duty Industries, Inc.
FLEETWOOD, PENNA.

For more data circle 497 on Postpaid Card

December, 1958



SAVE with ALL NEW DUDGEON EXTERNAL HONE

(PATENT PENDING)

EXTERNAL FINISHES BEEN TOO EXPENSIVE?

SAVE ON INITIAL COST

\$89.50 Complete

SAVE ON STONE COST

Group All Stones For
Maximum Discount

SAVE ON SETUP

Open Throat Gets
Behind Shoulders

SAVE ON EQUIPMENT

Will Operate With Any
Machine Which Rotates Work

SAVE ON REJECTS

Most Efficient Control
Of Size and Finish

WRITE TODAY

for Specifications and Price List

M. DUDGEON CO.

P. O. BOX 450

PITTSBURG, KANSAS

For more data circle 498 on Postpaid Card

modern machine shop 203

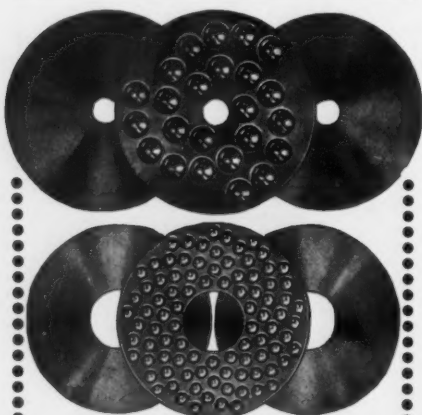
new shop equipment . . .

four through holes accept socket head cap screws to provide a simplified mounting method for anti-friction way bearings.

This development has been designed to give unlimited travel, constant accuracy and reduction of feed power. The center guided roller eliminates roller skew, minimizes bearing wear and lubrication requirements. All working parts of the bearing are made of 52100 bearing steel to provide extremely low bearing life and operational accuracy.

The recirculation bearing is available in varied loads from 2,000 to 32,000 pounds in standard precision or with matched sets for unusually accurate applications in precision machines.

For more data circle 114 on Postpaid Card



BALL THRUST BEARINGS

STANDARD SIZES ARE SHOWN IN OUR GENERAL CATALOG, SENT UPON REQUEST.

Serving Industry for Over 46 Years

THE GWILLIAM COMPANY

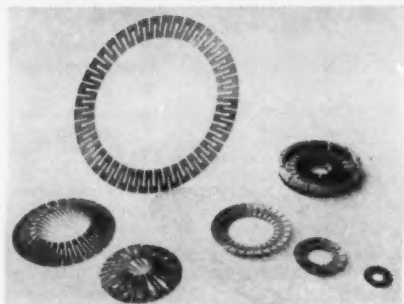
INCORPORATED 1912

358 FURMAN ST.

BROOKLYN 1, N. Y.

For more data circle 499 on Postpaid Card

204 modern machine shop



Ringspann Discs for clamping and chucking

DISCS FOR CLAMPING AND CHUCKING OF WORKPIECES

A series of discs, for use in the precision clamping and chucking of workpieces with cylindrical clamping surfaces, is now being marketed under the name of Ringspann by Karl A. Neise, Department MMS-108, 404 Fourth Ave., New York 16, N. Y.

- **PIERCING PUNCHES**
- **BUTTON DIES**
- **STANDARDS · SPECIALS**

Also send Blue Prints for Estimates on screw machine products and centerless grinding.

PEMCO PERFORATORS CO.

DIVISION

PORTER MACHINE CO.

CINCINNATI 9

OHIO

For more data circle 500 on Postpaid Card

Viking

• THE ORIGINAL COMPOUND SHEAR



CUTTING PRESSURE
20 times the applied pressure

VIKING SHEAR COMPANY
1018 W. 20th ST. • ERIE, PA.

Cuts straight, angle or circle in copper, brass, tin up to 12 gauge steel, etc. Special steel blades ground and tempered, adjustable and replaceable.

For more data circle 501 on Postpaid Card

December, 1958



NEW 1959 MODEL "SS" RADIUS DRESSER

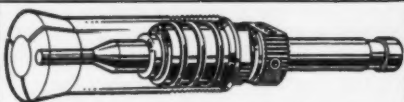
outperforms them all
Cut production time
without sacrificing accu-
racy! Easy to set, easy
to see, eliminates nec-
essity of guard removal.
Somerset Radius Dress-
er turns "tricky" jobs
into routine operations.

At new low price \$124.50
with diamond.

SOMERSET TOOL CO.

Write for free
illustrated folder.
320 Virginia St.
Hillside, N. J.

For more data circle 502 on Postpaid Card



NEW! Self-Centering 5C Collet Stop

Quick friction adjustment. Stays in fixed position.
Will not distort collet. Will not move back. Also
available for other collets and spindles. 30 Days
Free Trial. Several Territories Open for Distributors.

Write for Bulletin.

BYCO INDUSTRIES

2200 Snelling Ave. Minneapolis 4, Minn.

For more data circle 503 on Postpaid Card



6" Universal Dividing Head

with
DIRECT INDEXING

Optional SWIVEL BASE converts a con-
ventional dividing head into a universal
work head or rotary table. Change-over
is accomplished in seconds without tools
or wrenches.

Also available in 10" - 12" sizes and
in 10" - 12" spiral drive.

Write for Catalog

CARROLL DIVIDING HEAD CO.

3525 Cardiff Ave. • Cincinnati, Ohio

For more data circle 504 on Postpaid Card

December, 1958

New CATALOG

WM. SOPKO & SONS CO.

GRINDING WHEEL ADAPTERS

AND TOOLROOM ACCESSORIES

WRITE
FOR YOUR
FREE COPY



Finest quality ADAPTERS

- Precision-made, Hardened and Ground with Heat Treated Nuts
- Complete Line—4 New Models Available
- For Use on All Popular Surface Tool and Cutter Grinders
- Large Stocks—Immediate Delivery

USE SOPKO ADAPTERS—SAVE
TIME, TROUBLE AND MONEY

WM. SOPKO & SONS CO.

140 E. 267th ST. • EUCLID 32, OHIO

Please send your New Free illustrated CATALOG

NAME _____ TITLE _____

COMPANY _____

STREET _____

CITY _____ STATE _____

For more data circle 505 on Postpaid Card

modern machine shop 205

**PACE TAPER ROLLER BEARING
LIVE CENTERS
ACCURACY
 $\pm .0001''$ TIR
RIGIDITY**



Preloaded with two Precision Matched Timken or Bower Taper Roller Bearings for . . . **GRINDING • PRECISION TURNING
HEAVY-DUTY OPERATIONS**

Write to:

PACE ENGINEERING COMPANY
1507-B E. Michigan St., Indianapolis, Ind.

For more data circle 506 on Postpaid Card

**Accurate Hole Transfer Made Easy With
NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from $\frac{3}{16}''$ to $\frac{3}{4}''$ U.S.S. Inexpensive — Last for years.



Write for Circular

**NIELSEN TOOL &
DIE COMPANY**

17360 Lahser Road, room 202
Detroit 19, Michigan

For more data circle 507 on Postpaid Card

RIVETERS . . .



**PIONEERS
and
PACEMAKERS
in their
line**



—head rivets from smallest to $\frac{3}{4}''$ diameter cold steel, either by **NOISELESS SPINNING** or **VIBRATING HAMMER** method — fast, economically — types include Vertical and Horizontal Spindles, foot-power or automatic.

Free estimates of your work.

Write for catalog today.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. Bridgeport 5, Conn.

For more data circle 508 on Postpaid Card

206 modern machine shop

new shop equipment . . .

Claimed to solve the problem of chucking round workpieces easily, efficiently and concentrically, the discs have the shape of a flat slotted ring with a taper between the outside and inside diameter. The slots start alternately from the i.d. to the o.d. This has the effect of enlarging the diameters when pressure is applied and the height of the spring is reduced.

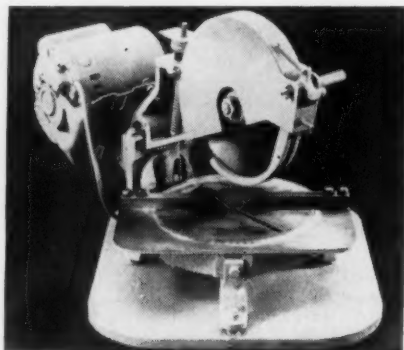
Ringspann Discs are made with outside diameters from 0.550 inch to 7.870 inches. These discs may be adapted to the chucking and clamping of a wide variety of workpiece shapes. Literature, showing and describing any number of fixtures that have been developed with Ringspann Discs to solve specific clamping problems, is available.

For more data circle 115 on Postpaid Card

★ modern machine shop ★

PORTABLE CHOP SAW

Irvington Machine Works, 1808 Northeast Seventh Ave., Portland 12, Ore., recently introduced its No. 29 Chop Saw, which is an extremely



Irvington No. 29 Chop Sawing Machine

December, 1958



DRILL THESE HOLES
 BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
 Wilmerding, Pa.

For more data circle 509 on Postpaid Card

JIG BORING

and

Large Precision Machining

Done to your specifications

We have 22 Jig Borers

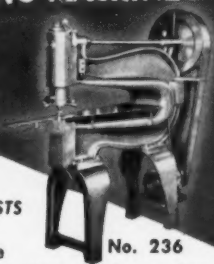
KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 510 on Postpaid Card

SAVAGE NIBBLING MACHINES

Patented
Tool Holder
Assembly →



NIBBLE your COSTS

- No sparks
- No open flame
- No oxidation
- No second operations

No. 236

Totally enclosed head . . . for safety.
 Direct-over-center positive drive . . . gives more power.

One-piece 360° revolving head . . . for fewer parts and longer life.

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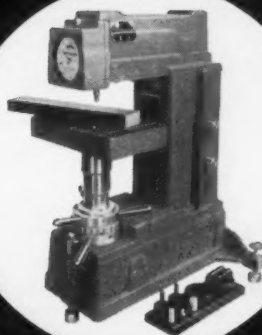
W. J. SAVAGE CO.
 KNOXVILLE TENNESSEE

For more data circle 511 on Postpaid Card
 December, 1958

2 Applications

(Regular and Superficial)

1 Tester



KENTRALL MODEL CT-2 \$750.

Hundreds of installations over the past few years have proved the economy of the only hardness tester which combines all scales of Rockwell Test (15 to 150 kg. loads).

The Kentrall cuts costs because it does the job of two conventional testers, requires only half the space and maintenance. Write for more detailed information, plus a list of prominent users who have switched to Kentrall.

TB147

KENTRALL

THE TORSION BALANCE COMPANY

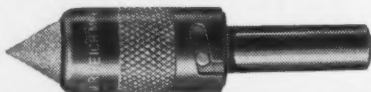
Main Office and Factory:

Clifton, New Jersey

Sales Offices: Chicago, San Francisco

For more data circle 512 on Postpaid Card
 modern machine shop 207

ABRASIVE CENT-R-LAP TOOL



Saves time, eliminates diamond dressing. Cones changed in seconds. Available in three sizes: $\frac{3}{8}$ ", $\frac{3}{4}$ " and $1\frac{1}{2}$ ". Cent-R-Laps and abrasive cones in leading grits. Write for descriptive literature and prices. Sold to consumers only.

J. R. REICH MANUFACTURING CO.
201 E. Stroop Rd. Dayton 29, Ohio

For more data circle 513 on Postpaid Card



Make **3**
hammers
AT ONCE!



It's the NEW, easy, economical, quick way to mold your own lead hammers on a production basis with "SHUR-GRIP" handles and this COOK production mold.

Write for circular and prices
LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.

For more data circle 514 on Postpaid Card

LABOR SAVING Production CHUCK

Will pay for itself in 60 to 90 days

On turrets, engine lathes, cutting-off machines, drill presses or any type of chucking machine, the Barker Two-Jaw or Three-Jaw hand operated chuck will increase production up to one third and actually pay for itself while doing it in from 60 to 90 days.

Hand lever eliminates pneumatic and hydraulic systems, yet closes and locks jaws with lathe running or stopped. Over 30 years of labor saving, production boosting operation.



Hand lever closes and locks while lathe is running.



Write for bulletin 201 today.

CHUCK DIVISION

THOMAS HOIST CO.

28 S. HOYNE • CHICAGO 12, ILL.

For more data circle 515 on Postpaid Card

208 modern machine shop

new shop equipment . . .

versatile machine for all types of cut-off jobs requiring accuracy and fast production.

The No. 29 is ideal for production manufacturing utilizing non-ferrous metals, where accuracy within thousandths of an inch is imperative. This unit weighs only 80 pounds. A unique design feature permits making straight, angle or compound cuts with equal ease; no counterweight adjustment is needed.

The No. 29 is of all cast construction with heavy section castings. Close coupled, one piece arm casting provides permanent and positive alignment. Saw arbor and pivot are carried on sealed for life ball bearings. The saw table is calibrated in degrees to aid angle setting. The vee belt and 9 inch saw blade are fully guarded for safety.

By mounting two No. 29 Chop Saws on a common base, both ends of a piece may be precision cut at the same time.

For more data circle 116 on Postpaid Card

★ modern machine shop ★

COMPLETELY AUTOMATIC BENDING MACHINE

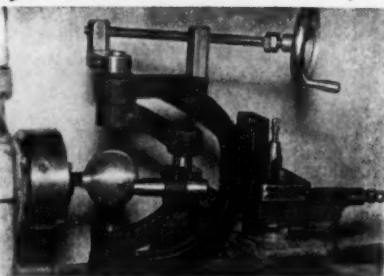
A 100 percent automatic bending machine that requires no operator and, therefore, has no direct labor charge in its operation, has been announced by the Pedrick Tool and Machine Co., Department 5, 3640 North Lawrence St., Philadelphia 40, Pa. The Pedrimatic, as it is called, is machine loaded and, therefore, the law of diminishing returns does not operate to reduce the ratio of grooves per die to pieces per minute.

In a Pedrimatic, a ten groove die will produce twice as many pieces per minute as a five groove die.

December, 1958

Now

RADITURN ✓



CUTS ANY RADIUS Convex, Concave or Ball

Patented

The accurate short cut for turning any radius.
Adaptable to most any lathe.

Contact your tool supplier or write for details.

RETCO MFG. & SALES

1458 E. CLINTON

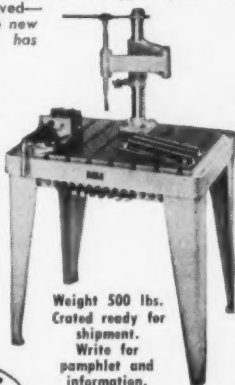
• FRANKFORT, IND.

For more data circle 516 on Postpaid Card

Try this Allman Universal Hand Tapper FREE for 15 days—

Results have proved that once this tapper is in your shop or tool-room and you find 70% of your free hand tapping time saved—it will stay there! The new Allman hand tapper has these advantages:

- Articulate arm swings clear of large table for placement of work.
- Limitless number of sizes of tapped holes without moving work piece.
- Vise holds work as small as $\frac{3}{8}$ " square.
- Floating tap locates itself in hole.
- Individual spindle holds taps, thus change requires only seconds



Weight 500 lbs.
Crated ready for shipment.
Write for pamphlet and information.

**TOOLS,
INC.**

1734 No. 25th Ave. • Melrose Park, Ill.

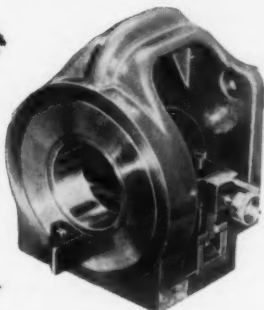
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TURN IRREGULAR SHAPES with the POLYGON TOOL BOX

GREENLEES

ACME GRIDLEYS

BROWN & SHARPES



CONOMATICS

NEW BRITAINS

ALL TURRET LATHES

With this Tool Box you can turn hexagonal, octagonal and other irregular contours from round stock, drilled and finished in one operation. Produce mating internal and external shaped parts. 48 Hour Delivery on Cams.

Price and complete details on request.

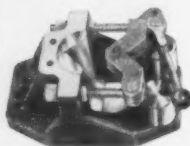
BRADLEY MACHINERY CO.

4400 CONNER

DETROIT 15, MICH.

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LASSY WORKHOLDERS



A basic tool for many uses and with accessories provides many fast setups for production, eliminating the need for single purpose fixtures. Accurate to .0002.

Lassy Work Holders maintain repetitive work alignment and accuracy.



Write for New Illustrated Catalog
on Time Saving Devices

LASSY TOOL CO.
PLAINVILLE, CONNECTICUT

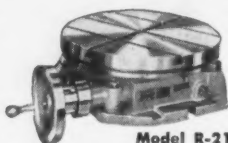
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TROYKE ROTARY TABLES

New Design

Greater
Precision

Greater
Rigidity



Model R-21

6 Sizes • 8 Models

Guaranteed 60 seconds or less total accumulative angular error. (60 seconds equals .00087" at 6" diameter.)

Write for FREE Catalog Number 23.



TROYKE MFG. CO.

11296 Orchard Street
Cincinnati 41 (Sharonville), Ohio

For more data circle 520 on Postpaid Card

210 modern machine shop

new shop equipment . . .



Pedrimatic Automatic Bending Machine

The loading arrangement is an important feature. The Pedrimatic is an end loader, being loaded by air or hydraulic cylinder. The entrance of the straight piece ejects the piece already there which has been bent. It is just as feasible to load ten pieces that have been stacked in a conveyor as it is to load one.

The Pedrimatic is a rotary head automatic bending machine. This method combines speed with no tangent limitations.

For more data circle 117 on Postpaid Card

★ modern machine shop ★

GAP PRESS EQUIPPED WITH AUTOMATIC FEED

Series G1 Single Point Gap Presses, in capacities ranging from 75 through 250 tons and equipped with feeds for automatic production, are being built by The Minster Machine Co., Minster, Ohio.

Either single or double roll feed equipment can be supplied on the

December, 1958

De

KEO**COMBINED DRILLS****and COUNTERSINKS**

- Both old and new series carried in stock for immediate delivery. Finest high speed steel. Ground spiral flutes. New standard simplifies and improves size progression. New comparison chart mailed on request. Shows new standard sizes—both plain and bell type, including long series, 4"-6" in stock. Specials to your blue prints.

KEO CUTTERS, INC.

25040 Easy St., Warren, Mich.
Warehouse: 1300 S. Soto St., Los Angeles 23, Calif.

For more data circle 521 on Postpaid Card

SPECIFY Dependable GRAYMILLS COOLANT PUMPS and Complete Coolant Systems

There's a dependable Graymills Coolant Pump or complete unit for most Machine Tools. For conversion to wet cutting, replacement or original equipment. Centrifugal and Gear types. 1/25 to 2 H.P. Tank capacities to fit your needs.

Stocked by Industrial Distributors.
Send for catalog with selection chart.

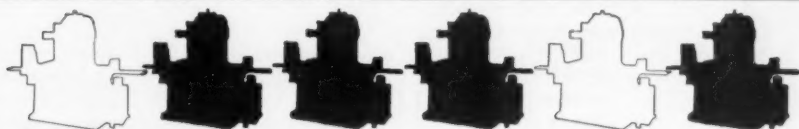
150

GRAYMILLS CORP.

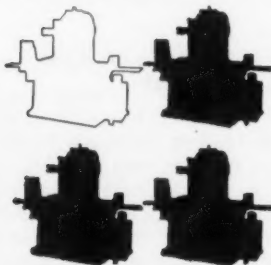
3749 North
Lincoln Ave.
Chicago 13,
Illinois



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SEVEN OUT OF EVERY TEN

GRAND RAPIDS GRINDERS...

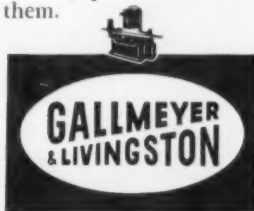
— are purchased by firms already owning one or more of them. Three out of every 10 sold go to new customers. Once you've enjoyed the advantages of a Grand Rapids Grinder in your plant, chances are, like so many present users, you'll surely want more of them.

Write for 24-page book
that tells you why.

GALLMEYER & LIVINGSTON CO.

408 Straight Ave., S.W.

Grand Rapids, Michigan



*Save Costly
Regrinding!*

**Anderson
NEW, IMPROVED
HAND SCRAPER**

After the original regrinding most users of this new Anderson hand scraper find that only honing is necessary. Judge for yourself: Order as many Model 5-D scrapers as you want. We'll send them promptly. Use them a full week... if they don't live up to all your expectations, send them back to us for refund.

**Faster Cutting
Easier to Use
Just the Right Spring
Palm Fitting Grip
Light in Weight**

18" — 20" — 22" lengths

\$6.75... with high speed steel blades

\$9.85... with carbide-tipped blades

\$1.75... for rubber bumper shown below

**ORDER AS MANY AS YOU NEED
MONEY-BACK GUARANTEE**

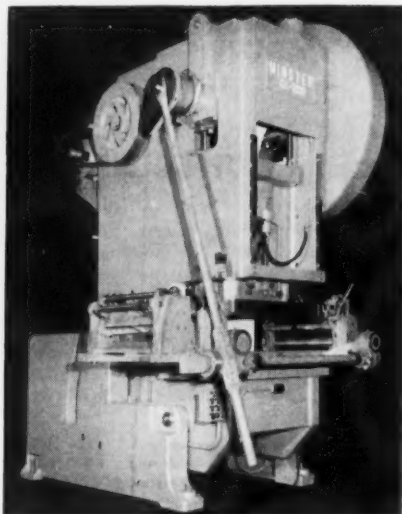
Indicate choice of high-speed steel or carbide-tipped blades, and 18", 20", or 22" lengths. We suggest you include rubber bumpers in your order. Write today for Bulletin No. 12-22.

**ANDERSON
BROS. MFG. CO.
1807 Kishwaukee St.
ROCKFORD
ILLINOIS**

For more data circle 523 on Postpaid Card

212 modern machine shop

new shop equipment . . .



Minster Series G1 Single Point Gap Press

single geared Series G1 Presses, which are available in both fixed base and inclinable types. These presses feature a massive steel frame to achieve minimum deflection and the compressive strength needed to increase vibration dampening capacity.

For more data circle 118 on Postpaid Card

★ modern machine shop ★

**UNIVERSAL SHEARING AND
FORMING MACHINE**

American Pullmax Co., Inc., 2465 North Sheffield Ave., Chicago 14, Ill., has announced two new models of Pullmax Universal Shearing and Forming Machines. These machines are known as the Models P-1 and U-10.

The P-1 Machine has been especially designed for the small sheet metal

December, 1958

**COLDPOINT
DRILL**

"The drill that hasn't been stopped yet"

If you have a drilling problem, we think we can solve it. We can sell you the drills or do your drilling on a contract basis.

MOSSBERG, INC.
7824 HAMILTON AVENUE
CINCINNATI 31, OHIO

For more data circle 524 on Postpaid Card

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- Ground Cut Rotary Files for Soft Metals.
- Hand Chisel Cut for Hard Metals.
- Carbide Rotary Files.
- Salvage and Regrinding Service.
- Dealers Inquiries Invited.

Rota FILE CORP.
1328—58TH ST.
BROOKLYN 19, N. Y.

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The STEVENS Line SINCE 1925

Introducing NEW series

15" ROTARY TABLE—STD.



ROTARY TABLES, 5-7½-8-12-15-18-24" sizes both standard and dial indexing types
ADJUSTABLE TILTING TABLES, #0-1-2
COMPOUND TABLES, #1-2
ROTARY-COMPOUND TABLES, #1-1½-2
INDEX CENTERS—multiple spindle
SPECIAL MACHINES—designed and built.

See your dealer or write for bulletins

The John B. Stevens Company
Main Street, Somersville, Conn., U. S. A.

For more data circle 526 on Postpaid Card
December, 1958



SUNNEN

PORTABLE HONES

SAVE MANY HOURS IN PRODUCTION,
SALVAGE, JOB LOT, MAINTENANCE
AND TOOL ROOM

More than 100,000 satisfied users testify to the utility of these "Tools of a Thousand Uses" for internal diameter work in nearly all materials.

Sunnen Portable Hones are guaranteed to produce geometrically round, straight bores—accurate within .0005"—with any desired cross-hatched, lubricant-retaining finish.

Corrects Errors	Fastest Stock Removal
Exact Size Control	Positive Adjustment
Controlled Finish	Portable, Yet Rugged
Operates in any Position	

Your Sunnen Field Engineer will be glad to help you solve your sizing problems at no obligation to you.

SN-75 Midget Hone	Range 1¾" to 2"
JN-95 Junior Hone	Range 2" to 2½"
AN-112 Standard Hone	Range 2½" to 7"
AN-812 Heavy Duty Hone	Range 4¾" to 20½"

WRITE FOR FREE BOOKLET!



SUNNEN
PRODUCTS COMPANY
HONING

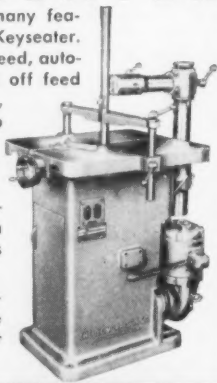
7924-Y Manchester Ave. • St. Louis 17, Mo.
Canadian Factory: Chatham, Ontario

For more data circle 527 on Postpaid Card
modern machine shop 213

MORRISON 1" AUTOMATIC KEYSEATER

Investigate the many features of this new Keyseater. It has automatic feed, automatic stop to cut off feed at given depth, automatic relief to back the work away from the cutter, automatic centering, automatic lubrication and no bushings required.

Write for more information on the finest Keyseater on the market.



THE D. C. MORRISON CO.

P. O. BOX 1017B • CINCINNATI 1, OHIO

For more data circle 528 on Postpaid Card

LEIGH Pocket Tools

No. 787 Carbide and Steel Scriber \$2.50

Points reverse for personal safety. Approximately $\frac{1}{2}$ " x $\frac{3}{64}$ " dia. solid carbide rod brazed into steel (not just tipped) permits many regrindings.



No. 634 Combination Scriber and Permanent Magnet \$2.25

EXTRA POINTS



Postpaid with money order or check.

New: No. 676-B "45° angle" Carbide Point, \$1.00 ea.
No. 787-B "45° angle" High Speed Steel Point \$.60 ea.

SPRING SPECIALTY CO.

27 N. FIFTH AVE. MAYWOOD, ILL.
For more data circle 529 on Postpaid Card

214 modern machine shop

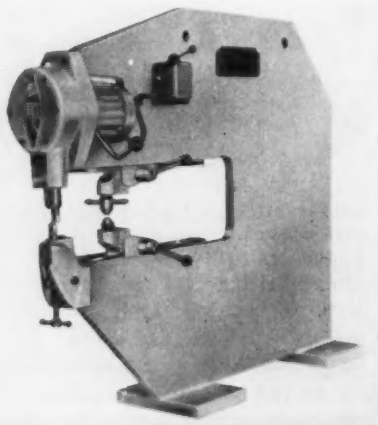
new shop equipment . . .

shop that works on lighter materials. The P-1 is the smallest machine in the Pullmax line.

The U-10 Machine is the largest in the Pullmax line, having an edge cutting capacity of $\frac{13}{32}$ inch in mild steel. The U-10 features a heavy duty, pneumatic circle cutting attachment and quick locking straight cutting attachment.

On all previous Pullmax models, the upper tool had to be raised and lowered by a hand lever. The U-10 features automatic raising and lowering of the upper tool, allowing the operator to have both hands free for inserting the material. The U-10 Machine can be slowed down to 350 s.p.m. or speeded up to 1,800 s.p.m. and features ten different stroke lengths, ranging from 0.001 to 0.375. The U-10 is of the box frame construction with the entire mechanism operating in an oil bath.

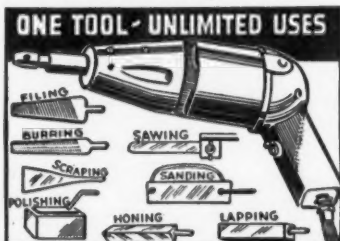
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Pullmax Shearing and Forming Machine

December, 1958

B-R-E-A-K...
Hand Finishing Bottlenecks
 with Portable Electric
 Reciprocating Tools



These handy tools will cut out many tedious hand filing and finishing operations—Increase Production—Produce Uniform Work.

Light in Weight—Delivers $\frac{1}{8}$ " or $\frac{3}{16}$ " fixed stroke at 1000 strokes per minute—Operates on 110 volts AC or DC.

ACME TOOL CORP.

73 WEST BROADWAY NEW YORK 7, N. Y.

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CONTINUOUS HINGES

Manufactured by

**AUTO MOULDING
 & MFG. CO.**

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CHICAGO 19

For more data circle 531 on Postpaid Card
 December, 1958

Great Buys from

VICTOR

Extra Long, Straight Shank
 High Speed Drills

12" OA, 9" FLUTE



SIZE	PRICE	SIZE	PRICE
1/8	1.65	27/64	3.30
9/64	1.75	7/16	3.30
5/32	1.75	29/64	3.60
11/64	1.85	15/32	3.60
3/16	1.85	31/64	3.60
13/64	1.95	1/2	3.60
7/32	1.95	33/64	4.20
15/64	2.05	17/32	4.20
1/4	2.05	35/64	4.50
17/64	2.15	9/16	4.50
9/32	2.15	37/64	4.75
19/64	2.25	19/32	4.75
5/16	2.25	39/64	5.00
21/64	2.50	5/8	5.00
11/32	2.50	21/32	5.40
23/64	2.75	11/16	5.80
3/8	2.75	23/32	6.25
25/64	3.05	3/4	6.75
13/32	3.05		

18" OA, 13 1/2"-14" FLUTE

SIZE	PRICE	SIZE	PRICE
3/16	4.00	9/16	8.75
7/32	4.10	19/32	9.50
1/4	4.10	5/8	10.00
9/32	4.75	41/64	11.00
5/16	4.75	21/32	11.00
11/32	5.25	43/64	12.00
3/8	5.25	11/16	12.00
13/32	6.00	45/64	13.00
7/16	6.00	23/32	13.00
15/32	6.50	47/64	14.00
1/2	7.00	3/4	14.00
17/32	8.50		

Order Today

IMMEDIATE DELIVERY!

VICTOR

MACHINERY EXCHANGE INC.

Dealers in Tool Room Equipment

251 CENTRE STREET, DEPT. B

Tel.: CAnal 6-5575, New York 13, N. Y.

For more data circle 532 on Postpaid Card
 modern machine shop 215

new shop equipment . . .

ALUMINUM FAN IS STANDARD EQUIPMENT ON MIST COLLECTORS

Aget Manufacturing Co., 1398 East Church St., Adrian, Mich., has announced the inclusion of non-magnetic, sparkproof fans in its Model VCS-2 (shown in the accompanying illustration), as well as other models in its

Mistkop line. Made of hardened, cast aluminum, the manufacturer claims that these fans cannot attract metal fragments or give off sparks in the event of accidental contact. Company officials emphasize the importance of this feature in reducing the danger from vapors of a combustible or explosive nature.

The Mistkops themselves are completely fireproof. These efficient mist-fog collectors are built to a simplified design consisting of a fan, filter and

condensate element. The only electrical power required is for the operation of the motor. No special connections, duct work or piping are needed and there is nothing to get out of order. Life of condensing material is normally from six months to one year. Mistkop Collectors have suction capacities of from 600 to 3,600 cubic feet per minute.

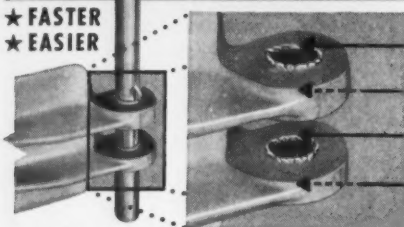
For more data circle 120 on Postpaid Card



Mistkop Mist Collector

HOW TO.... DEBURR THESE INACCESSIBLE HOLE FACES BY MACHINE OPERATION with the amazing NOBUR TOOL

★ FASTER
★ EASIER



1 Insert NOBUR tool in any machine spindle. A light pressure of the revolving cutter blade against the workpiece quickly deburrs the outside surface.

2 After outside surface is deburred, slide knurled sleeve back to fully retract the cutter-blade below pilot body diameter.

3 With cutter-blade retracted move workpiece or tool to position for deburring inside surface. Raise cutter-blade to deburr first one surface then the other.

No more hand finishing methods for those hard-to-get-at inner surfaces on multi-wall parts. The NOBUR Tool with its double edge cutting blade does the job in seconds...all by machine operation. Can be used by anyone, with complete safety, on your own lathe, drill press, etc. Simple to operate.

Write for FREE Folder

Send for all details on
Nobur Tool Products TODAY!



N-11



NOBUR

MANUFACTURING CO.
6860 Farndale Ave., No. Hollywood, California

For more data circle 533 on Postpaid Card

Specify



PRESS ROOM EQUIPMENT

ROLL FEEDS

Accurate Feeding —
Reversible
Easy to install
Highest Quality
Increased
Production at
Low Cost



SCRAP CHOPPER

Fits any Power
Press
Electrical Plug
Installation.
Pays for itself
you get more
for your scrap.



STOCK OILER

Saves your dies
eliminates hand
oiling
Made in variety
of sizes

Write Now

for new catalog showing prices and complete line of Equipment.

DURANT Tool Supply Co.

9 Thurbers Ave. • Providence 5, R. I.

For more data circle 534 on Postpaid Card
December, 1958

PRECISION DRILLING MACHINE

5/8"
CAPACITY

Designed
for
Those Jobs
Where
Accuracy
Is
Important.



FEATURES—

- Precision ball bearing spindle with minimum run out
- Accurate mounting of head and column to insure squareness of spindle to table
- Built-in gear drive for extra low speeds
- Convenient direct reading infinitely variable spindle speed control dial, together with a drill size, speed and material chart
- Quick-set vernier depth control
- Heavy construction to maintain accuracy
- Available in bench or floor models. (Bench model illustrated)

Write for More Descriptive Bulletin

The ELECTRO-MECHANCO Co.

265 East Erie Street • Milwaukee 2, Wis.

For more data circle 535 on Postpaid Card
modern machine shop 217

new shop equipment . . .

DIES FOR BENDING AND FORMING ALLOY SHEETS AND PLATES

Dreis and Krump Manufacturing Co., 7418 South Loomis Boulevard, Chicago 36, Ill., has announced a complete line of dies for bending and forming the various alloy sheets and

plates used in aircraft, missiles, rockets and other fabrications. They are known as the Chicago Alloy-Form Dies and will fit any make of press brake.

These dies are made of high quality carbon steel with the forming edges provided with a super fine finish in order to avoid marring the material surfaces. The wear surfaces of the die are induction hardened in order to prolong their life without reworking.

For more data circle 121 on Postpaid Card

★ mm ★

DRILL BUSHING FOR PLASTIC TOOLING

American Drill Bushing Co., 5107 Pacific Boulevard, Los Angeles 58, Calif., has announced the availability of the American Redskin, which is a drill bushing used in plastic tooling. This new idea in drill bushings for plastic tooling eliminates the major problem of spin out, caused from overheating.



Redskin Drill Bushing

In gaging close-tolerance holes —

High Precision need NOT mean High Cost!

INVESTIGATE COMTORPLUG the Economy Internal Gage



"Use it at machine & bench"



For holes $\frac{1}{8}$ " to 10" diameter



COMTORPLUG USERS INCLUDE

Airsearch Mfg. Co.	Hamilton Standard Division
Allison Div.	Harris Seybold Co.
Apex Electrical Mfg.	Hemelite Corp.
Buick Motor Div.	Int. Harvester Co.
Century Electric Co.	Jacobs Mfg. Co.
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Chrysler Corp.	McDonnell Aircraft
Continental Motors	National Lead
Curtiss-Wright	Northrop Aircraft
Detroit Transmission	Pontiac Motor Div.
Douglas Aircraft	Scintilla Magneto
Fairchild Engine & Airplane Co.	Steel Products Eng.
Falk Corp.	Studebaker-Packard
Ford Motor Co.	Sylvania (Atomic Div.)
General Electric Co.	United Airlines
	Warner Gear Div.

- easy to put into your routine.
 - will please the Purchasing Dept.
 - no base, no electronic "black box," no trailing hose.
 - portable as a pencil.
- Positive precision within .0001".
A fixed — not passing — reading.
Shows actual hole size.
Detects deviations from true cylindrical form such as front or back tapers, ovality, bell mouth, barrel shape.
Can measure very shallow holes.

SEND FOR BULLETIN 50 →

COMTOR COMPANY, 64 FARWELL ST., WALTHAM 54, MASS.

COMTORPLUG

For more data circle 536 on Postpaid Card



TO BE SURE OF
QUALITY
Remember
the Name

HOGGSON

**STEEL
STAMPS**



CHAMFERED
CORNERS
*for locating
the base*

**FINEST
STEEL**

long
life



ALSO IN
REVERSE
FOR
MOLDS
& DIES

Letters and figures, deep-cut in hardened, special-formula steel, assure clean impressions and long service. Wide range of letter sizes. At your Mill Supply or write for circulars.

HOGGSON & PETTIS MFG. CO.

New Haven 7, Connecticut
For more data circle 537 on Postpaid Card
December, 1958

**FASTER PRODUCTION
of PRECISION CAMS,
O-RING GROOVES
& hundreds of other
contoured parts**



REGENT

2 or 3 dimensional FLUID MOTION Duplicator Tables

Fastest Profile Milling and Duplicating

Save up to 50% and more machining time on contoured parts with both the R-200 and R-300 models. Single-lever control allows operators to duplicate complex parts in a fraction of the usual time.

R-200 — 2-Dimensional Profiler for any vertical miller

R-300 — 2- and 3- Dimensional for Bridgeport millers

Capacity: 6" x 6" (7" x 6" Special)
1 to 1 ratio with master

For literature write to
J. M. KALINS & COMPANY
1579 Railroad Ave., Bridgeport, Conn.
For more data circle 538 on Postpaid Card
modern machine shop 219

new shop equipment . . .

The Redskin consists of American's precision Delt-A-Grip drill bushing, molded into special plastic by Rezolin. This balanced combination carries away frictional heat before it can destroy the bond between bushings and plastic fixture, thereby preventing misalignment or spin out. The encase-

ment of the Redskin Bushing will resist temperatures of over 600 degrees Fahrenheit.

As an added safety precaution, the Redskin will discolor and smoke when the steel insert reaches 400 to 500 degrees F. This provides ample warning of improper drilling practices. For more data circle 122 on Postpaid Card

★ modern machine shop ★

Wanted MANUFACTURER'S REPRESENTATIVES

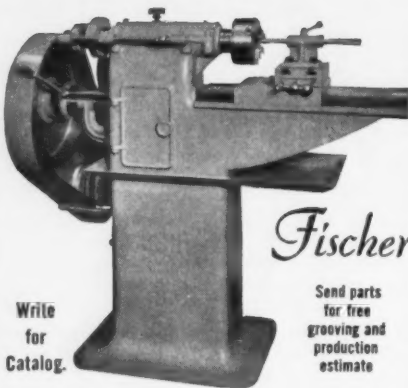
For our fine line of precision ground "TRU-TEX" Flat Ground Stock to be handled on an exclusive basis in your territory.

"TRU-TEX" Division
THE H & R SUPPLY CO
P. O. Box 104 • Cincinnati 31, Ohio

For more data circle 539 on Postpaid Card

BED TURRET FOR LARGE SIZE LATHES

An extra heavy duty A. K. Bed Turret is now being produced in two models, 350 and 400, by Precision Processing Co., 3269 Casitas Ave., Los Angeles 39, Calif. This bed turret has been specially designed and engineered to meet the demands of the larger size lathes such as the Cincinnati, LeBlond, Monarch, Rivett and many others in the 13 to 16 inch range.



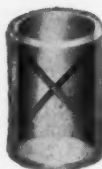
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for
Catalog.

Fischer

Send parts
for free
grooving and
production
estimate

ESTABLISHED 1900

FISCHER MACHINE CO.
ELEVENTH & WOOD STS. • PHILADELPHIA 7, PA.



... OIL GROOVERS

The FISCHER No. 1 Oil Groover cuts a wide variety of grooves in bearings up to 8" in length and up to 5" inside diameter. A few simple settings permit you to cut continuous, relieved, straight or spiral grooves at any angle from parallel to perpendicular to the work. Grooves may also be cut in shafts, housings, etc. This machine will slash grooving time and deliver continuous profitable production in your shop. It will pay to find out what it can do on your grooving jobs.

For more data circle 540 on Postpaid Card

RELIANCE E.Z. SET DIAMOND HOLDER



Wait 24 hours for a reset? Pay \$2.00 for a reset?
—Not if you own a Reliance E.Z. SET holder—
Just turn the pressure cap. Your diamond is set.

Shipped on 10-day Money-Back Guarantee
E.Z. SET complete with 1/4 carat diamond...\$7.50
Extra 1/4 carat diamond octahedrons, each...\$3.75
ORDER DIRECT — WE PAY POSTAGE CHARGES

RELIANCE TOOL & MFG. CO.

1919 N. Clybourn Ave.

Chicago 14, Ill.

For more data circle 541 on Postpaid Card

READ TEMPERATURES FAST

ACCURATELY
with PYRO
OPTICAL PYROMETERS

Send for catalog No. 85
PYROMETER INSTRUMENT CO., INC.
Bergenfield 42, New Jersey

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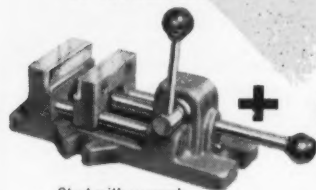
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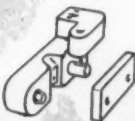
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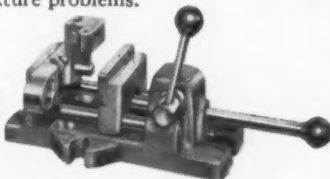
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Start with a speedy
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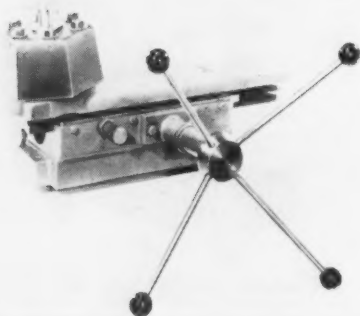
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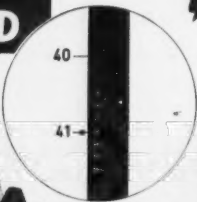
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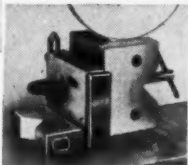
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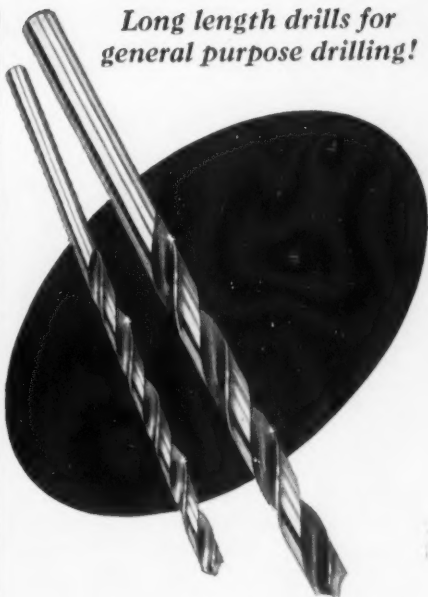
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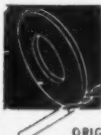


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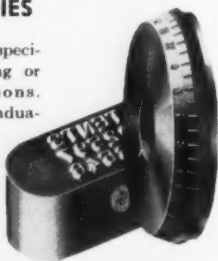
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modern machine shop 223

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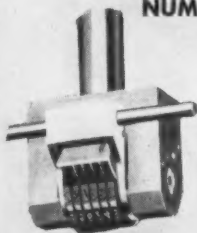
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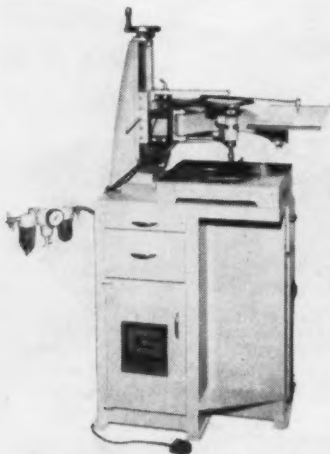
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224 modern machine shop

new shop equipment . . .

available with an air cylinder attachment for high speed drilling of printed circuits. The versatile heavy duty Model D-2 provides ratios from 2 to 1 to infinity. Up to 100 holes per minute can be drilled by unskilled operators. Various holes can be drilled without changing tools, as the pantograph principle permits guiding the stylus over the master template to whatever diameters are to be reproduced. Foot switch power control facilitates rapid production. Bellows controls, regulating valve and air filter provide dependable pneumatic action for up and down control of the spindle. The air attachment in no way interferes with the normal use of the pantograph for engraving. The Model D-2 heavy duty pantograph is a versatile engraver for two dimensional work with a single micrometer adjustment for height.

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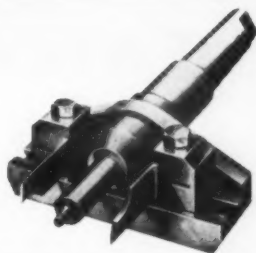
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December, 1958

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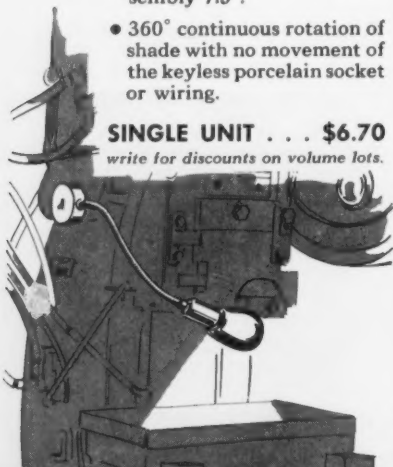
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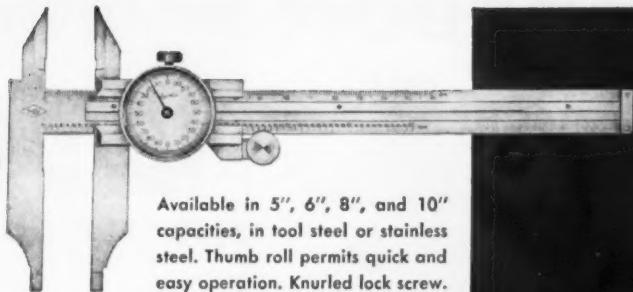
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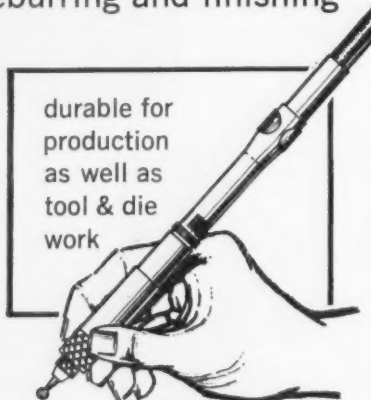
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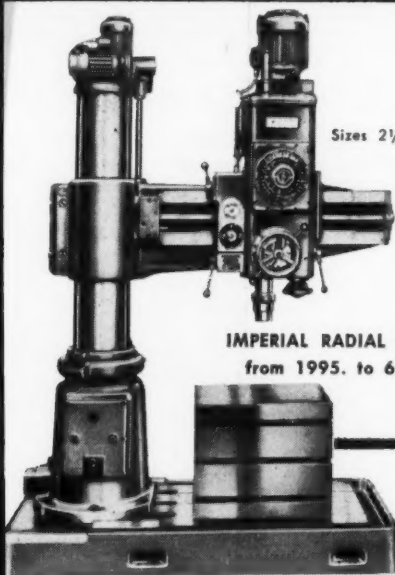
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December, 1958

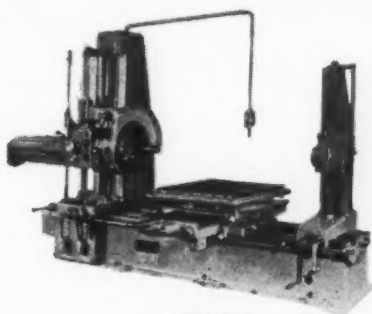
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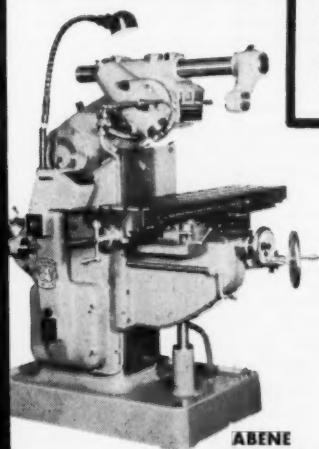


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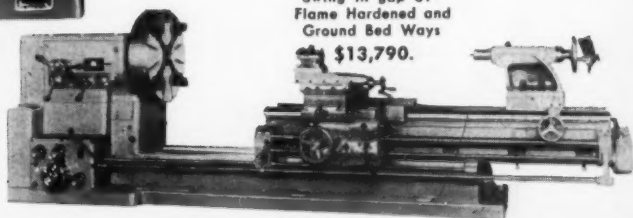
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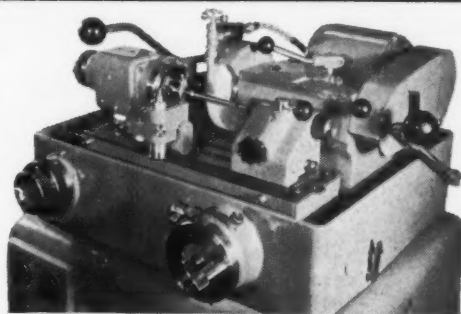
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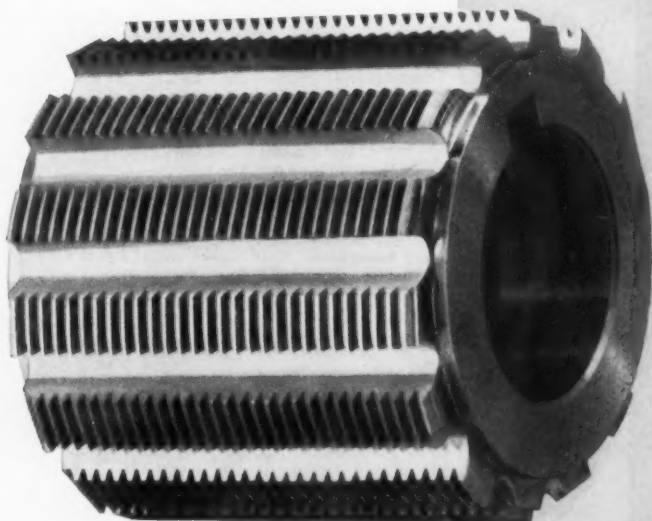
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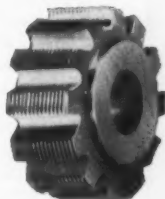
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December, 1958

modern machine shop 231



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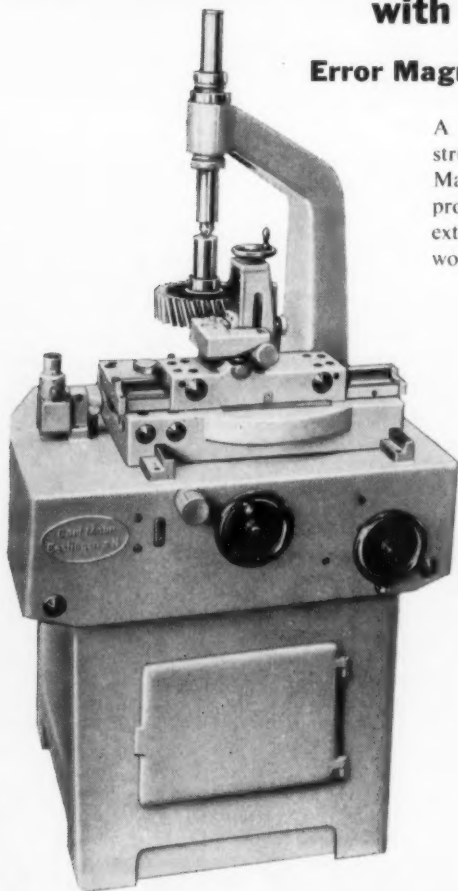
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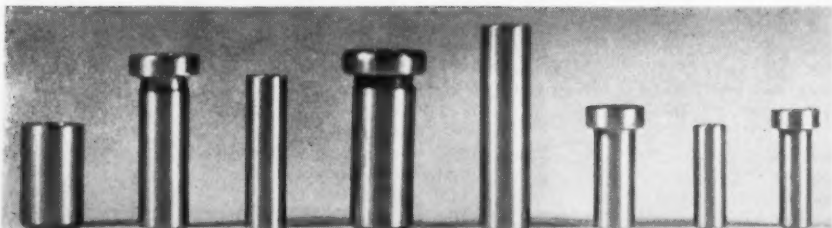
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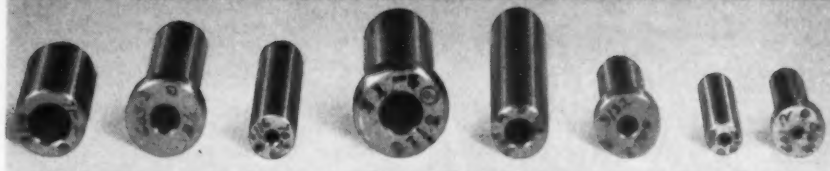
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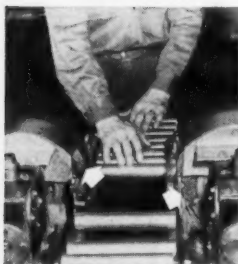
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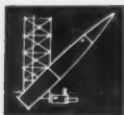


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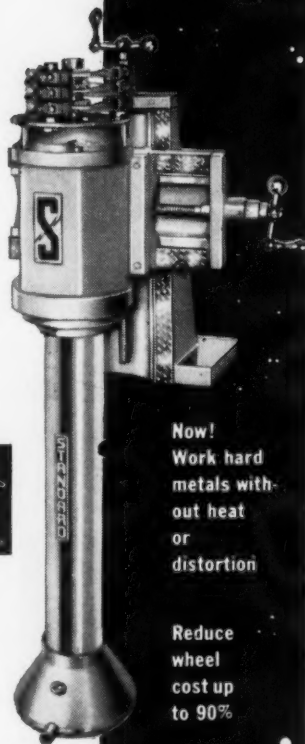
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DECEMBER, 1958

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307	328	349	370	391	416	441	466	491	516
308	329	350	371	392	417	442	467	492	517
309	330	351	372	393	418	443	468	493	518
310	331	352	373	394	419	444	469	494	519
311	332	353	374	395	420	445	470	495	520
312	333	354	375	396	421	446	471	496	521
313	334	355	376	397	422	447	472	497	522
314	335	356	377	398	423	448	473	498	523
315	336	357	378	399	424	449	474	499	524
316	337	358	379	400	425	450	475	500	525
317	338	359	380	401	426	451	476	501	526
318	339	360	381	402	427	452	477	502	527
319	340	361	382	403	428	453	478	503	528
320	341	362	383	404	429	454	479	504	529
321	342	363	384	405	430	455	480	505	530
322	343	364	385	406	431	456	481	506	531
323	344	365	386	407	432	457	482	507	532
324	345	366	387	408	433	458	483	508	533
325	346	367	388	409	434	459	484	509	534

535	560	585	610
536	561	586	611
537	562	587	612
538	563	588	613
539	564	589	614
540	565	590	615
541	566	591	616
542	567	592	617
543	568	593	618
544	569	594	619
545	570	595	620
546	571	596	621
547	572	597	622
548	573	598	623
549	574	599	624
550	575	600	625
551	576	601	626
552	577	602	627
553	578	603	628
554	579	604	629
555	580	605	630
556	581	606	631
557	582	607	632
558	583	608	633
559	584	609	634

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3H?

5C?

3AT?

7 OR 9 B&S?

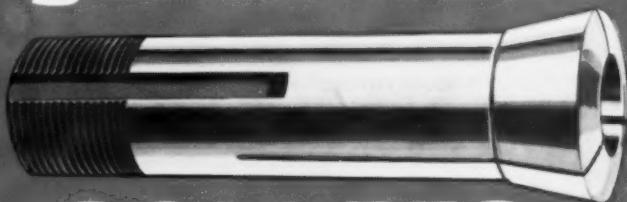
2MT?

ROUND?

HEX?

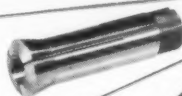
SQUARE?

get SUTTON

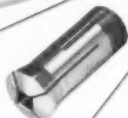


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